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SOUTHERN MEDICAL ASSOCIATION, Twenty-Third Annual Meeting, Miami, Florida, November 20-22, 1929. Pre-Meeting Clinics, November 19, 1929

TABLE OF CONTENTS

Pathogenesis and Treatment of Acidosis and Alkalosis. Alexis F. Hartmann, St. Louis, Mo. 517

Discussed by Lawrence T. Royster, University, Va.; John Lovett Morse, Boston, Mass.

Bromoderma Treated with Sodium Chlorid. A. H. Lancaster, Knoxville, Tennessee 521

Discussed by Thomas W. Murrell, Richmond, Va.; George M. MacKee, New York, N. Y.; Cosby Swanson, Atlanta, Ga.; D. C. Smith, University, Va.; Bedford Shelmire, Dallas, Tex.; J. L. Kirby-Smith, Jacksonville, Fla.

Spontaneous Pneumothorax in Children Under Two Years. Benjamin Bashinski, Macon, Ga. 525

Discussed by Joseph Yampolsky, Atlanta, Ga.; John A. Foote, Washington, D. C.; J. Mac. Bell, Mobile, Ala.

Resection of Prostrate Gland Obstructions with Stern's Resectoscope Equipment. T. M. Davis, Greenville, South Carolina 528

Discussed by H. W. E. Walther, New Orleans, La.; Thomas D. Moore, Memphis, Tenn.; S. J. R. Murchison, Fort Worth, Texas.

Experimental Ligation of One Ureter, with Simultaneous Decapsulation of the Kidney on the Same Side. Joseph A. Abercrombie and Percy Nolen, Birmingham, Ala. 535

Congenital Diverticulum of the Esophagus: Case Report. Leslie V. Rush and C. R. Stingily, Meridian, Miss. 546

Roentgen Therapy of Pertussis. Ernest Charles Samuel, New Orleans, La. 548

Discussed by E. C. Thrash, Atlanta, Ga.; Floyd D. Rodgers, Columbia, S. C.; John D. MacRae, Asheville, N. C.

(Continued on next page)

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TABLE OF CONTENTS—Concluded

Treatment of Chronic Maxillary Sinus Suppuration. R. M. Armstrong, Lexington, Ky. 551
Discussed by J. A. Stucky, Lexington, Ky.; John J. Shea, Memphis, Tenn.; John H. Foster, Dallas, Tex.

Some Causes of Occasional Infections in Clean Abdominal Cases. C. N. Carraway, Birmingham, Ala. 554
Discussed by Frank K. Boland, Atlanta, Ga.

Control of Biologicals with Special Reference to the Scarlet Fever Products. R. E. Dyer, Washington, D. C. 556
Discussed by B. L. Arms, Jacksonville, Fla.; William Litterer, Nashville, Tenn.; H. S. Mustard, Murfreesboro, Tenn.; A. T. McCormack, Louisville, Ky.; C. W. Garrison, Little Rock, Ark.

Endocervicitis. W. F. Shallenberger, Atlanta, Ga. 561
Discussed by Ernest Harl White, Little Rock, Ark.; William Neill, Baltimore, Md.; Frank H. Walke, Shreveport, La.; L. E. Burch, Nashville, Tenn.

Infantile Eczema. C. O. King, Birmingham, Ala. 563
Discussed by Cosby Swanson, Atlanta, Ga.; George M. MacKee, New York, N. Y.; H. H. Hazen, Washington, D. C.; H. M. Robinson, Baltimore, Md.; Ray M. Balyeat, Oklahoma City, Okla.

Methods Used in the Treatment of Inguinal Hernia. J. E. Cannaday, Charleston, W. Va. 568
Discussed by A. G. Rutherford, Welch, W. Va.; E. Bennette Henson, Charleston, W. Va.; A. R. Koontz, Baltimore, Md.; C. N. Carraway, Birmingham, Ala.

The Heart in Pregnancy. T. P. Sparks, Jr., Jackson, Miss. 571
Discussed by Richard Paddock, St. Louis, Mo.; Thomas B. Sellers, New Orleans, La.

Healed Cavity Cases. J. H. McClellan, Oteen, N. C. 573

Nervous Influence on the Occurrence of Cardiac Arrhythmias. Drew Luten, St. Louis, Mo. 576
Discussed by Ellsworth Smith, St. Louis, Mo.

Acute Osteomyelitis and Complications. N. D. Bitting, Durham, N. C. 530
Discussed by J. S. Gaul, Charlotte, N. C.; R. Wallace Billington, Nashville, Tenn.; Allen Voshell, University, Va.; Wm. S. Baer, Baltimore, Md.

Pre-Eclamptic Toxemia. W. B. Anderson, Nashville, Tenn. 583
Discussed by Ivan Proctor, Raleigh, N. C.; R. W. White, Asheville, N. C.

The Correlation of Surgery, Radium and Deep X-Ray Therapy in the Treatment of Malignancy. Edward T. Newell, Chattanooga, Tenn. 585
Discussed by S. S. Marchbanks, Chattanooga, Tenn.; E. C. Samuel, New Orleans, La.; D. Y. Keith, Louisville, Ky.

Treatment and Management of Fractures of Hip in Old People. Lawson Thornton, Atlanta, Ga. 590
Discussed by H. Earle Conwell, Fairfield, Ala.; Thomas P. Goodwyn, Atlanta, Ga.; Albertus Cotton, Baltimore, Md.; J. Knox Simpson, Jacksonville, Fla.; Robt. F. Patterson, Knoxville, Tenn.; J. Albert Key, St. Louis, Mo.; O. L. Miller, Gastonia, North Carolina.

Tar and Quartz Light Therapy. J. Richard Allison, Columbia, S. C. 592
Discussed by Jack W. Jones, Atlanta, Ga.; Isaac R. Pels, Baltimore, Md.

Artificial Pneumothorax. G. O. Haynes, Oteen, N. C. 593

Coexisting Diabetes and Primary Anemia. Oscar Berghausen, Cincinnati, Ohio 594

Precocity from Hypopituitarism. Lewis W. Elias, Asheville, N. C. 595

EDITORIALS 597
The Miami Meeting
Sterility in Women
More Medical Libraries

MIAMI—WHERE WE MEET 600
Flying in Miami

OFFICERS 1928-1929 601

BOOK REVIEWS 602

SOUTHERN MEDICAL NEWS 602

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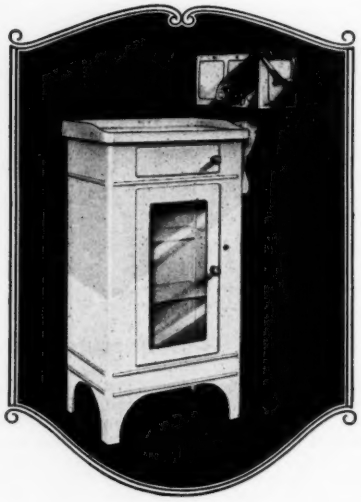

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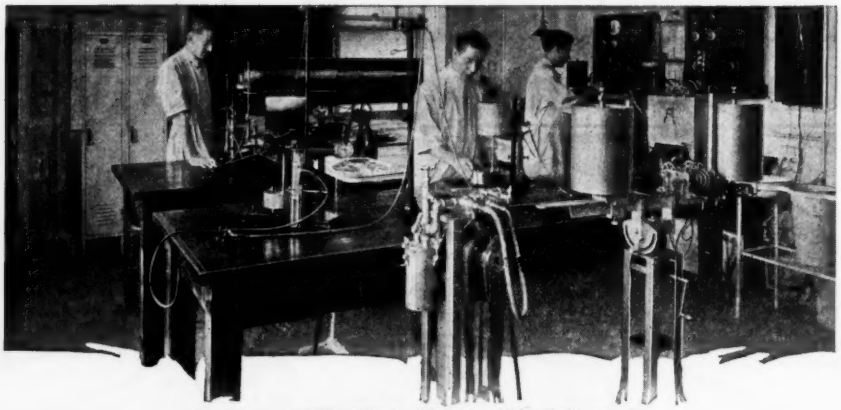

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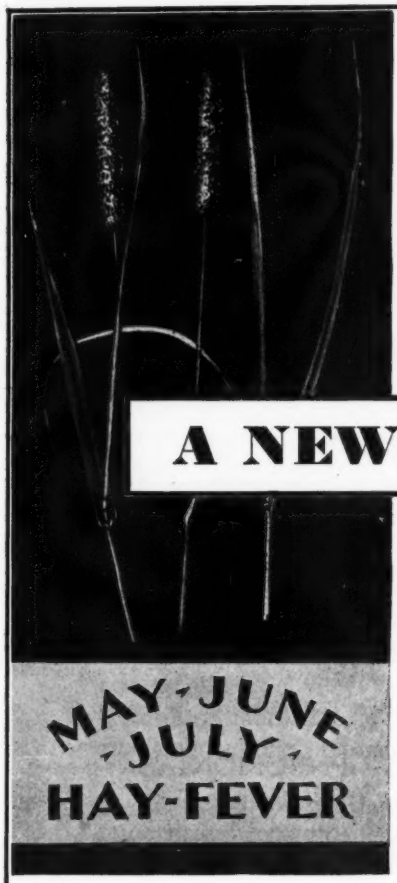

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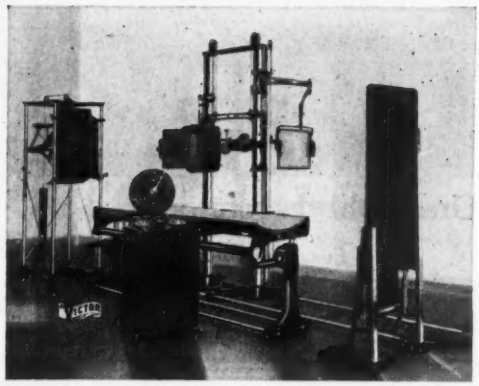

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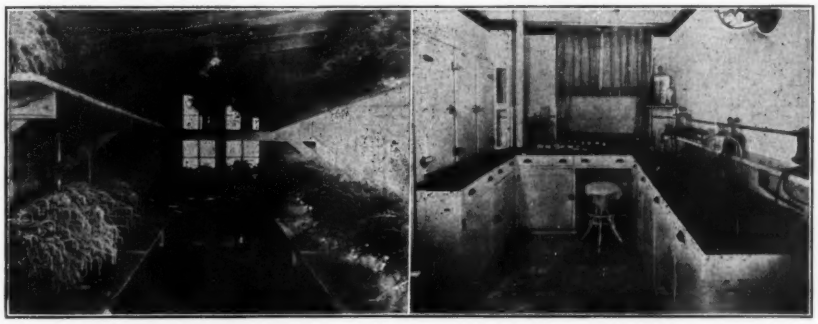

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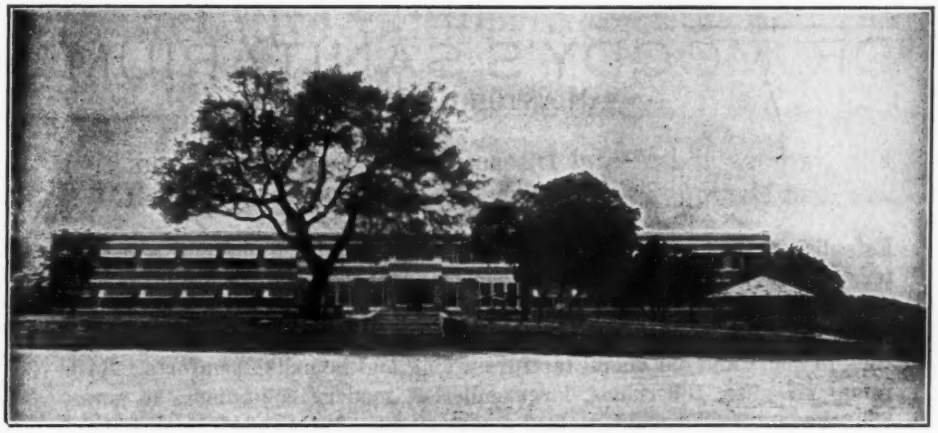

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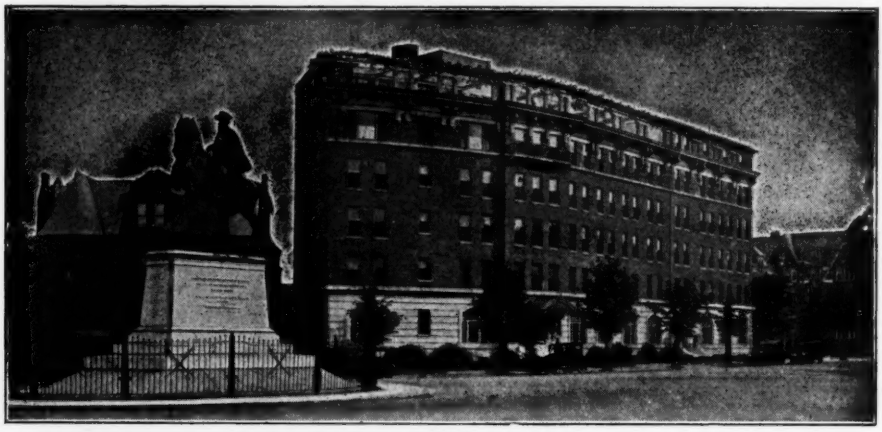

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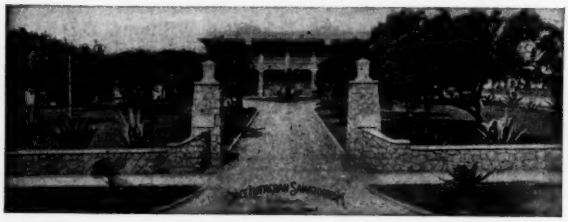

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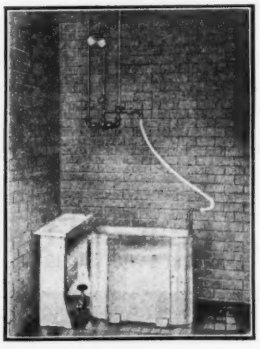

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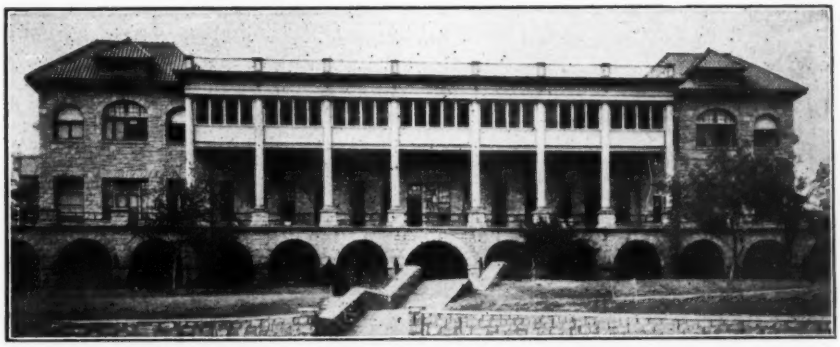

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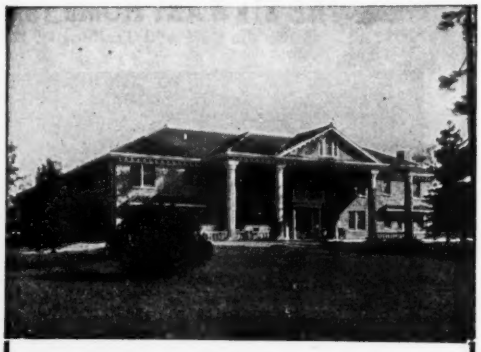

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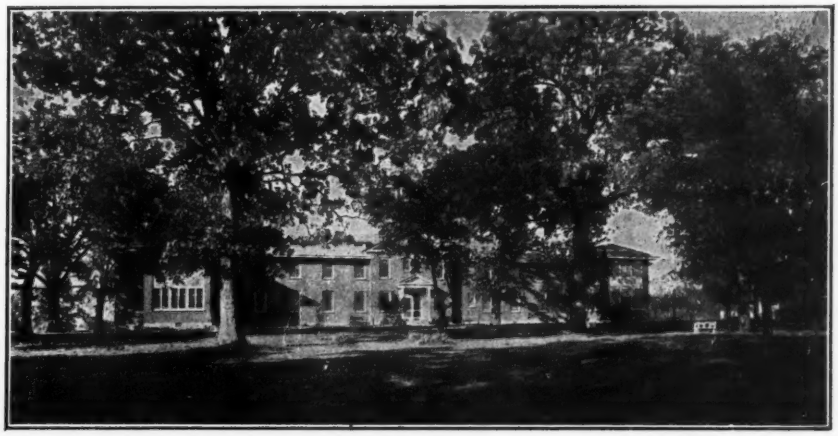

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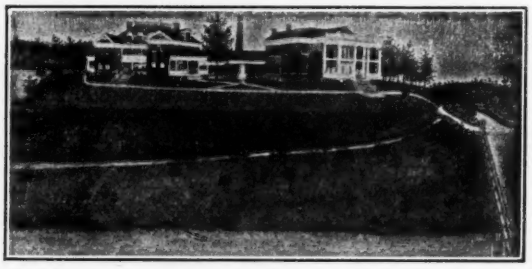

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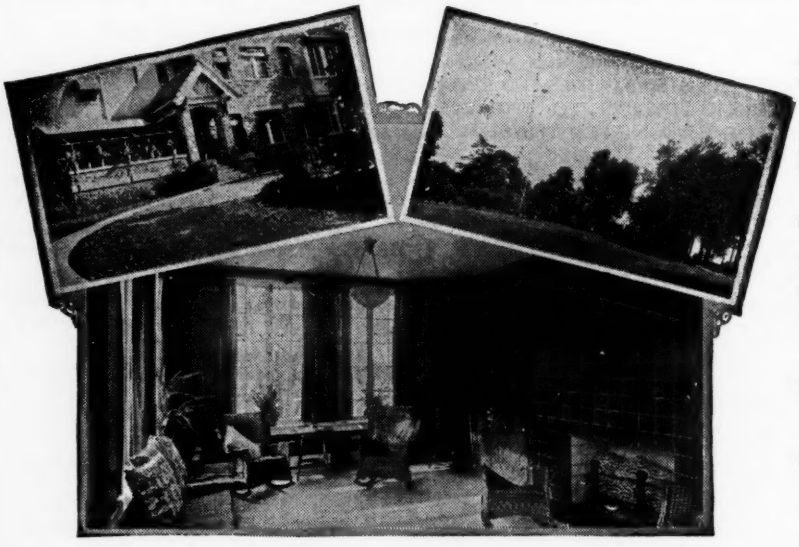

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PATHOGENESIS AND TREATMENT OF ACIDOSIS AND ALKALOSIS*†

By ALEXIS F. HARTMANN, M.D.,
St. Louis, Mo.

In health, the body fluids maintain with but surprisingly little variation, their normal osmolar, electrolyte and hydrogen ion concentrations. For detailed descriptions of the chemical composition of the body fluids, and the means by which it is kept constant under normal, as well as abnormal conditions, the reader is referred particularly to the papers of Van Slyke,[1] Gamble,[2] Peters,[3] Hartmann[4] and their coworkers. In disease, however, factors may operate in such a manner as to lead to serious changes in the composition of the body fluids. If, for instance, the ratio $\frac{BHCO_3}{H_2CO_3}$ (*base bicarbonate to carbonic acid*) is changed, there will also occur a shift in the hydrogen ion concentration, leading either to increased acidity or alkalinity. In the former instance we speak of acidosis, in the latter, alkalosis.

It is the object of this paper, first to discuss briefly the factors concerned in the pathogenesis of such changes, and then to outline the proper treatment for the more common and important forms of acidosis and alkalosis. In the following table the various types of both conditions are enumerated, with brief descriptions of the pathogenic factors.

TABLE 1

IMMEDIATE ETIOLOGICAL FACTORS IN THE VARIOUS TYPES OF ACIDOSIS AND ALKALOSIS

ACIDOSIS

Reduction of ratio: $\frac{BHCO_3}{H_2CO_3}$

(I) *Increase* of H_2CO_3: due to abnormal respiration or circulation. (Depressed breathing, high CO_2 content of inspired air, pulmonary atelectasis, venous stasis).

(II) *Decrease* of $BHCO_3$:

(a) Replacement of HCO_3 because of increase of other anions.

(1) *Lactate ion*: due to its increased formation or insufficient removal (strenuous muscular exertion, convulsions, hypoxidation because of poor circulation due to anoxemia or anhydremia).

(2) *Cl*: due to over administration of HCl, NH_4Cl, $CaCl_2$, or NaCl, or to insufficient urinary excretion.

(3) HPO_4: due to over-administration or

(4) SO_4: insufficient urinary excretion.

(5) Diacetate ion: due to abnormal

(6) Beta-oxybutyrate ion: $\frac{\text{fatty acid}}{\text{glucose}}$ oxidation.

(b) Loss of $BHCO_3$.

(1) By way of intestinal tract (diarrhea);

(2) By way of urinary tract (polyuria, kidney damage.

ALKALOSIS

Increase of ratio: $\frac{BHCO_3}{H_2CO_3}$

(I) *Increase* of $BHCO_3$:

(a) *Accumulation* of administered alkali.

(1) Over-dosage.

(2) Failure of urinary excretion.

(a) Pathological: due to kidney damage.

(b) Physiological: due to diminished plasma fixed base.

(b) *Replacement* of other anions by HCO_3.

(1) Cl: due to loss by vomiting or fistula of gastric juice.

(2) Lactate, diacetate and beta-oxybutyrate during recovery from acidosis under certain circumstances.

(II) *Decrease* of H_2CO_3: by hyperventilation.

(a) Voluntary.

(b) Involuntary: due to stimulation of the respiratory center by inflammation, pressure, or fever, or psychic disturbances, including hysteria.

We note that acidosis may result either from increase in carbonic acid secondary to abnormal respiration or circulation, or from decrease in base bicarbonate, due either to replacement of the bicarbonate ion by one or more of at least

*Read in Section on Pediatrics, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

†From the Department of Pediatrics, Washington University School of Medicine, and the St. Louis Children's Hospital.

six other anions, or to the actual loss of basic bicarbonate as such from the body by way of the gastro-intestinal or urinary tracts.

Alkalosis may result either from decrease in carbonic acid, due to voluntary or involuntary hyperventilation or to increase in base bicarbonate, the result either of accumulation of administered alkali or replacement of other anions, particularly the chlorid, by the bicarbonate ion.

These chemical changes, leading either to acidosis or alkalosis, are in turn dependent on such factors as vomiting, diarrhea, dehydration, anoxemia, inadequate dextrose oxidation or circulatory or renal insufficiency. There will not be sufficient time to discuss in detail the pathogenesis and treatment of each type of acidosis or alkalosis, and our remaining remarks will be confined to the acidosis associated with diarrhea and the alkalosis resulting from vomiting.

ACIDOSIS ASSOCIATED WITH DIARRHEA

When a young infant develops severe watery diarrhea, as a result either of an intestinal infection or of some type of parenteral infection, such as mastoiditis, characteristic changes in the composition of the body fluids, leading often to a very severe form of acidosis, are to be expected. Such changes as are found in blood plasmas are shown in *Chart 1* and consist of the following: (1) loss of water (anhydremia), (2) resultant concentration of all dissolved substances (solutes) except $BHCO_3$ (and frequently dextrose).

The reduction of $BHCO_3$ when but slight leads to no increase of acidity, because free carbonic acid is reduced proportionately by compensatory hyperpnea. When it is very greatly reduced, however, sufficient loss of carbonic acid cannot be effected by hyperventilation, and acidity may increase to a considerable extent (uncompensated acidosis).

Several factors may account for the reduction of $BHCO_3$. Because of the reduction of volume and flow of the blood due to water loss, insufficient oxygen may be carried to the tissues and such an anion as the lactate ion may accumulate at the expense of the bicarbonate ion. Also because of the water loss from the blood, urinary secretion may cease or be much diminished and such anions as the phosphate and sulfate ions, resulting from the oxidation chiefly of protein, may accumulate, also at the expense of the bicarbonate ion. The effect of such replacement of the bicarbonate ion by other ions, although usually significant and in occasional instances very pronounced, is not usually as important as the actual loss of $BHCO_3$ from the body. The summated effect, however, of ion substitution and total loss frequently leads to such severe reduction of $BHCO_3$ that death promptly occurs.

Based on this conception of the pathogenesis of diarrheal acidosis, the logical treatment should include: (1) dilution of the blood in order to restore its volume and flow so that the accumulated lactate ion may be disposed of in a normal fashion and release its base for combination with carbonic acid; (2) production of diuresis, so that accumulated anions such as phosphate, sulfate and chlorid may be excreted in combination with ammonia, and thus release the bound base to the bicarbonate ion; (3) restoration, in severe cases, of lost $BHCO_3$ by administration of that salt as such, and (4) when possible, removal of the infection causing the diarrhea (as for instance, antrotomy, in cases of mastoiditis).

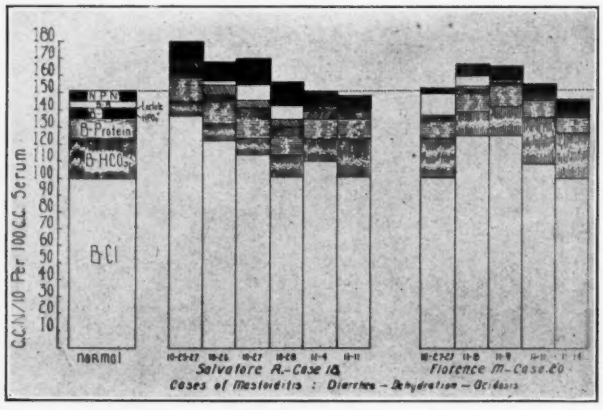

CHART 1

The composition of the blood plasma in severe acidosis associated with diarrhea, and the changes taking place during recovery.

Dilution of the blood and body tissues cannot usually be accomplished by the oral administration alone of water, because of vomiting and diarrhea. Parenteral administration is usually required. The fluid of choice is isotonic dextrose (6.0 per cent) administered subcutaneously, intraperitoneally or intravenously, or

by a combination of all three routes. Normal saline or Ringer's solution, while effective in the less severe cases, is contraindicated in those cases where marked diarrhea, dehydration and oliguria persist, since it tends further to increase the chlorid ion concentration of the body fluids at the expense of the bicarbonate.

Oral and parenteral administration of such fluids, besides diluting the blood and tissue fluids, will usually promote diuresis and permit renal excretion to aid in the support of diminished base bicarbonate. In the more severe cases, however, such administered fluid may be excreted into the intestinal tract without producing diuresis. Hypertonic dextrose solution (20 per cent) injected intravenously rather rapidly (20 to 30 c. c. per kilo of body weight in 10 to 15 minutes) may be more effective in promoting diuresis in some cases. The extent of $BHCO_3$ restoration by such renal activity is likely to be too slow in the very severe cases, however, to prevent death, and in such instances the parenteral administration of alkali is indicated.

For this purpose a 5 per cent solution of sodium bicarbonate in distilled water is prepared. For intravenous administration, such a solution may be safely prepared by taking the bicarbonate from a fresh package by means of a spatula passed through a flame, weighing on a filter paper taken from the center of a clean package and adding to cooled sterilized distilled water or dextrose solution. For subcutaneous or intraperitoneal administration, however, absolute sterility and reaction comparable to that of the normal body fluids are desired. A simple method of preparation is to add a few drops of phenol red indicator solution to 1½ per cent sodium bicarbonate, as prepared above, and after Berkefeld filtration, to pass carbon dioxid through the solution until a perceptible color change towards yellow is noted.

The usual dosage of sodium bicarbonate is 0.5 gm. per kilo body weight.

Such treatment must be continued as long as severe diarrhea and dehydration persist.

ALKALOSIS DUE TO VOMITING

When an infant develops severe and persistent vomiting, due, for instance, to hypertrophic pyloric stenosis, or high intestinal obstruction,* characteristic changes in the composition of the body fluids, often leading to a very pronounced form of alkalosis, are to be expected. Such changes as are found in the blood plasma are shown in *Chart 2*. The loss of water from the plasma as judged by increase in protein may occasionally be quite as marked as occurs in cases of severe dehydration due principally to diarrhea. Other solutes, such as phosphate, lactate and non-protein nitrogen are likewise concentrated, the latter sometimes very greatly. In sharp contrast, however, is the decided reduction of BCl and the very great increase in $BHCO_3$.

The total amount of elecytrolyte (base bound to the various anions) is less than normal.

The chief cause of the reduction of chlorid is the loss of gastric hydrochloric acid in the vomitus. The bicarbonate ion is held by the base from which the chlorid ion was released, and consequently $BHCO_3$ is increased. The sum of BCl and $BHCO_3$ is less than the normal, because BCl, as well as HCl, is lost in the vomitus.

When chlorid reduction and bicarbonate increase are marked, pronounced depression of respiration occurs, free carbonic acid is thus increased, and no great increase in alkalinity need result. When more hyperventilative respiration

*Vomiting due to most infections, exclusive of pyelitis, is not usually followed by much loss of gastric hydrochloric acid because of the diminished gastric secretion usually present during infection. Such vomiting, therefore, is not so likely to give rise to alkalosis, as is the vomiting associated with gastric or intestinal obstruction.

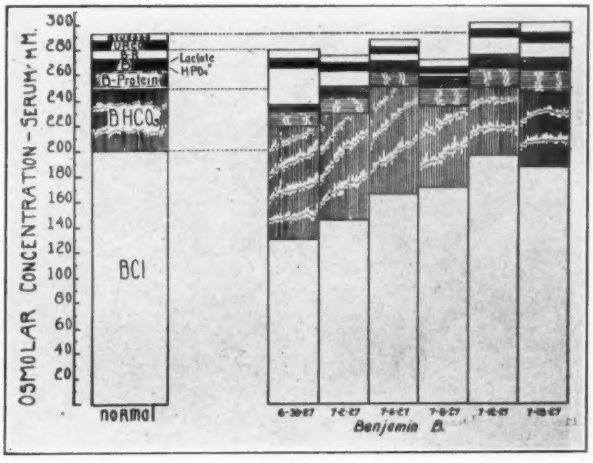

CHART 2

The composition of the blood plasma in severe alkalosis, the result of vomiting, and the changes taking place during recovery.

occurs, as a result of crying or fever, marked increase in alkalinity may result and be accompanied by severe tetany with convulsions. No diminution of $BHCO_3$ in the plasma by excretion into the urine is to be expected as long as the total base concentration is below normal. The urine even in alkalosis severe enough to be fatal is characteristically acid (free from $BHCO_3$). This fact should be borne in mind when alkali is administered therapeutically for pyelitis. If vomiting is a prominent symptom, alkalosis may already exist, but due to the reduction of chlorid and total base, $BHCO_3$ will not be secreted into the urine until after very large amounts of alkali have been given and alkalosis has been seriously increased. Administration of salt solution (BCl) in such cases, without any alkali ($BHCO_3$), will cause excretion of $BHCO_3$ into the urine sufficient to render it alkaline to litmus, and thus remove any excess of $BHCO_3$ present.

Treatment of this type of alkalosis should include: (1) relief of tetany, (2) restoration of depleted BCl, (3) removal of accumulated $BHCO_3$, and (4) dilution of the body fluids.

Tetany may be quickly relieved by the intravenous administration of $CaCl_2$ (5 per cent solution, 0.5 c. c. per kilo of body weight) and the breathing of 30 per cent carbon dioxid in oxygen. Ten per cent anhydrous magnesium sulfate given intramuscularly in dosage of 1 c. c. per kilo of body weight and repeated if necessary in 15 to 30 minutes is also effective in relieving this type of tetany. It tends to depress respiration, however, and since respiration tends already to be depressed, it should be used cautiously. BCl may be administered as Ringer's solution intraperitoneally, subcutaneously or intravenously. In sufficient quantity, Ringer's solution so administered will restore the BCl and water content of the blood and body fluids, and in addition cause excretion of $BHCO_3$ from the plasma into the urine, and thus reduce the alkali excess in the body fluids.

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DISCUSSION (*Abstract*)

Dr. Lawrence T. Royster, University, Va.—I am not going to attempt to discuss the chemical changes, but point out just one or two things that I think are practical applications, perhaps largely from the standpoint of the men outside of the hospital. Those of us who are working continuously in the hospital can apply these tests, but the man outside has not the facilities for them. I wish also to ask Dr. Hartmann whether he has seen any improvement in the absorption or metabolism of glucose combined with insulin.

I have precipitated alkalosis myself, before I knew what it was, in the days when we were learning something about pyelitis. We supposed invariably that it was a colon bacillus infection from the beginning and, recognizing that the organism was a facultative one, we changed its growth medium by either alkalinizing the urine rapidly or by acidifying it, as the case might be. I precipitated alkalosis then by pushing bicarbonate of soda. It is pertinent to recognize the danger of what we have hitherto regarded as the normal thing to give in cases of dehydration, and that is sodium chlorid. For the general practitioner that is the single most practical point Dr. Hartmann has brought out.

Sometimes we see in various conditions, in the presence of infections, gastro-intestinal disturbances which combine vomiting and diarrhea. I shall ask Dr. Hartmann to tell us something about them.

The general principle would seem to be in vomiting, to give one fluid; in diarrhea without vomiting, the other; and the general practitioner is perhaps fairly safe in keeping that in mind.

Dr. John Lovett Morse, Boston, Mass.—My knowledge of modern chemistry is most superficial. Nevertheless, I think that we all owe it to ourselves to try to understand its practical applications. In the first place, the chemists owe us a lot of papers of this sort. They were the ones who told us some years ago to give alkalosis in cases of acidosis. Then, when they found out that they were wrong, they laughed at us for doing what they had told us to do. It is up to them, therefore, to straighten us out and to re-establish our confidence in them.

In New England the diagnosis of acidosis is, unfortunately, a very common one. Every child that vomits has "acidosis" and is given orange juice and sugar, or, if he vomits much, glucose in one way or another. The type of acid intoxication for which this treatment is suitable is due to the oxybutyric acid group and is probably the most common type with us. It develops in connection with acute infections or after anesthetization. It really is, however, very uncommon and, in the vast majority of instances, the diagnosis of acidosis is wrong.

The chief things for us to remember, as clinicians, are that there are different types of acidosis due to different causes, that it is usually possible to tell from the cause what type of acidosis it is, and that the treatment of each type is different. Alkalosis, due to obstruction and severe vomiting, is uncommon and, of course, must be treated in an entirely different way.

If babies are properly fed and taken care of, and if physicians are called early and practise good medicine, babies will never get into a condition where they have either acidosis or alkalosis. Both are unnecessary and avoidable conditions.

Question.—Does Dr. Hartmann find that he can relieve these children always of their acidosis, and if

he cannot, what has taken place? It has been my impression that there is a point somewhere beyond which they cannot go and come back, in the rehabilitation of their blood, as it were.

Dr. Hartmann (closing).—Concerning the value of adding insulin to the glucose solution administered, we may say that we believe that there are only two conditions aside from severe diabetic acidosis in which the combination is helpful. One is the type of respiratory infection which is accompanied by vomiting, ketosis, enlargement of the liver, and a tendency towards elevation of blood sugar. The administration of insulin with glucose apparently increases the rate of glucose and acetone body oxidation, just as it does in diabetes; but also, perhaps, by causing storage of glycogen, it aids in the repair of liver damage. Insulin and glucose are also helpful in the case of the very athreptic infant who simply cannot take enough food by mouth to permit satisfactory gain in weight. Combined with insulin, hypertonic glucose, even though given intravenously, may be largely retained by the infant and almost completely burned or stored as glycogen. In other cases no benefit seems to be derived from combining insulin with glucose.

As to the application of the principles discussed by the country practitioner, we may say that, although detailed and extensive chemical studies of the blood and urine were required to gain our present conception of the pathogenesis of the various types of acidosis and alkalosis, and to correlate chemical and laboratory observations, such study is usually unnecessary both for establishing the type and extent of chemical change and for instituting effective therapy. When, for instance, severe watery diarrhea occurs, we should expect the type of changes which give rise to acidosis; and observations of respiration, weight change, skin color and turgor, and urinary output should be sufficient to inform us when fluid administration as salt solution should be supplemented by glucose and alkali administration. On the other hand, when vomiting is severe we expect increased alkalinity of the blood and increased acidity of the urine, especially when vomiting is dependent on some obstructive cause, and such a chemical diagnosis may usually be made and treatment followed by clinical observation plus such simple chemical observations as would determine the approximate reaction (pH) of the urine and the presence or absence of more than traces of chlorid and ammonia. In the more puzzling cases, valuable information will be gained if only the chlorid and carbon dioxid contents of the blood plasma are determined. This is particularly true of severe pyelitis, associated with marked vomiting, with resultant chlorid loss and alkalosis, or urinary stagnation with secondary ammonia formation and alkalinity. In such instances, clinical observation plus simple chemical observation will tell us when administration of salt rather than alkali will not only more safely, but also more effectively, lead to secretion of more alkaline urine, and when we have given too much acid in conjunction with methenamine and have produced acidosis in our attempt to render the urine properly acid.

Dr. Morse mentioned the fact that the earlier experience of Dr. Howland and Dr. Marriott with administration of alkali to infants with acidosis associated with diarrhea was not very encouraging. The reason was, I think, that alkali was not given in the proper amount, the dosage sometimes being so large that alkalosis resulted, and sometimes so small that it had very little effect. In addition, the importance of continued administration of fluid and electrolytes of the proper type was not so well appreciated then as now.

Dr. Morse, in referring to his success with just glucose administration in cases of cyclic vomiting with ketosis, did not make clear the fact that the mere presence of acetone on the breath or diacetic acid in the urine is not sufficient for a diagnosis of acidosis. A patient with ketosis may have acidosis, mild or severe, but on the other hand may have marked alkalosis. Administration of glucose solution would tend to restore lost body water, cause oxidation of organic acid, lead to diuresis, and therefore be very valuable. If, however, very severe acidosis exists, alkali plus glucose would be indicated, and if marked alkalosis were present, salt plus glucose.

Dr. Morse also stated that only poor pediatric practice would give rise to the type of case discussed, which I do think is not altogether true. Very severe dehydration and acidosis may result in twelve to twenty-four hours from severe watery diarrhea, and progress despite dietary restrictions and administration of salt solution, for causes that we have already mentioned. But even if the statement were correct, it would not excuse us for failure to make use of the more recently acquired knowledge of scientific treatment.

Another question asked was whether all cases of acidosis can be relieved by our method. If by acidosis is meant only bicarbonate and pH reduction, the answer is yes. Death, however, cannot be always prevented, even after restoration of the normal reaction of the body fluids, since apparently when severe acidosis persists long enough irreparable damage is done to the cells. It is not uncommon, however, to see patients recover whose chance for recovery, as judged by results of former methods of treatment, would seem extremely slight.

BROMODERMA TREATED WITH SODIUM CHLORID*

By A. H. LANCASTER, M.D.,
Knoxville, Tenn.

Compounds containing a high percentage of the different salts of bromin are unusually popular with the profession in quieting the nerves and promoting rest in nervous individuals. Patients and their friends have been successful in finding many highly advertised preparations on the market capable of producing the desired physiological effect. Many consumers not being aware of the evil effects produced by an excess of bromids, have been unfortunate victims of such remedies. Nervine, peacock bromid, bromoquinin have all been sources of severe bromid eruptions in patients seen by me in the last few months. The individual taking the bromids is the one most frequently affected.

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*Read in Section on Dermatology and Syphilology, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

Case 1
Five weeks' treatment with sodium chlorid produced completely involution of granulomatous lesions.

Numerous cases have been reported in breast-fed infants whose mothers were habitual users of bromids. Costello reported a case of placental transmission. The mother had taken large doses of bromin without any symptoms. The child had not been breast-fed, yet three days after birth it developed a bromin rash.

Although bromoderma is a comparatively common drug eruption, if we allow our index of suspicion to become low and are not acquainted with its clinical manifestations we may allow a case to go undiagnosed. The lesions produced by bromids are polymorphous. There may be a combination of any of the following: macules, acne-like papules and pustules, vesicles, furuncles, wheals, ulcers and hyperplastic granulomas. Discrete acne-like papulopustular and pustular lesions are common about the face, back, shoulders and extremities, and a group may become confluent, forming a conglomerate patch. The hyperplastic granulomatous lesions, as well as the ulcerative lesions, are frequently observed on the extremities, especially the lower extremities and on the faces of infants.

The bromid eruption may resemble acne, differing often from the ordinary acne in the greater degree of inflammation, the lesions of bromoderma being larger, darker and more indurated. Types are frequently seen resembling syphilis, blastomycosis, erythema induratum, and other conditions. By the use of microscopical, serological and other laboratory tests we are helped considerably in arriving at a diagnosis. Although dermatologists frequently frown upon history as an aid in diagnosis, here a positive history is extremely important. But in the presence of a negative history of bromids contradicted by objective symptoms we should not be too hasty in dismissing bromoderma. I had considerable difficulty in obtaining a history of ingestion of bromid in two of my cases who were absolutely honest. In one I was able to get a history of oral administration of no medicine except from the attending physician, who told me the patient was taking large doses of bromids in order to stay off morphin.

In reviewing the literature on the subject we find that much has been written and many theories have been advanced to be contradicted by later investigations. Dermatologists should feel grateful to Wile and his co-workers who have supplied us with some well founded theories on bromoderma. Wile summed up his findings in a paper before the Section of Dermatology and Syphilis at the meeting of the American Medical Association at Washington in May, 1927, as follows:

"(1) Ingested bromid was with difficulty passed through the renal epithelium.

Case 2
Bromid acne. From two weeks' use of nervine. Completely healed in four weeks.

"(2) Salts of bromin tend in consequence to be stored up in the tissues of the body.

"(3) Bromid displaces the chlorid ion in the body, the ingestion of the former leading to rapid elimination of the latter, with consequent chlorid deficiency.

"(4) In cases of bromid intoxication, the intravenous injection of physiologic sodium chlorid solution leads to the liberation of the bromid from the tissues, occasionally accompanied by a sharp renal irritation.

"(5) The replacement of bromids in the tissues by chlorid immediately influences the symptoms of bromism, notably those in the nervous system and in the skin, causing their rapid involution."

According to Bernoulli, a replacement of more than 40 per cent of the chlorids of the blood by bromids is fatal (*Arch. F. exper. Path. u. Pharmakol,* 73:355, 1913).

Dr. George H. Belote, a co-worker of Dr. Wile, is the donor of a practical chemical test for the presence of bromin in the urine. By this test it is possible to detect bromin in blood, urine, sweat, saliva, gastric juices and unruptured bullae in patients taking large doses of bromids.

The test is carried out as follows: small strips of filter paper are soaked in a saturated solution of fluorescein in 60 per cent acetic acid. These are then allowed to dry and may be kept indefinitely as indicators of the test. The urine or suspected fluid is placed in a test tube. To this a few crystals of potassium permanganate are added. After agitation a few drops of concentrated sulphuric acid are added and the fluorescein paper is held, after moistening with 2 per cent acetic acid at the mouth of the test tube. The presence of bromin in the suspected fluid changes the color of the fluorescein paper from yellow to bright pink. The presence of the other halogens does not interfere with the test. The presence of chlorin makes the test more sensitive.

Case 1.—A woman, age 30, was first seen April 24, 1928. She had on the front and back of both legs large, slightly elevated, pustular lesions covered with heavy crusts. New lesions on the legs were vesicular and pustular in character. The condition had started five weeks before. Physical examination revealed no other abnormality. The lesions were treated locally with 5 per cent ammoniated mercury ointment and 5 per cent aqueous gentian violet solution and she was allowed to return home and expected that she would make an early recovery.

On May 2 she returned to my office. The lesions were more numerous, larger, granulomatous in nature, some were elevated about one centimeter and umbilicated. There were no crusts and very little pus. Some of the lesions had coalesced and formed large granulomatous plaques. Some of the single lesions were 5 cm. in diameter. All granulomatous lesions were limited to the legs. There were some vesicular lesions on the upper extremities and back. Diagnosis on the second visit was bromoderma. After so long a time I learned that bromids had been prescribed by the family physician and she had taken Peacock's bromid for several months to quiet her nerves. For the preceding few weeks she had not measured the dose at times; just drank it out of the bottle.

She was put in the hospital. The Wassermann was negative and all laboratory tests were negative except that for bromid, which was positive. Normal saline, 50 c. c., was administered intravenously at daily intervals for ten days. During this time improvement was marked. The patient was discharged and given one-half skin unit of x-rays. She returned to the office every three days for 100 c. c. of normal saline for three visits, then once a week for two weeks. She was discharged at the end of this time as cured. Thirty-four days were required to cure her. She was also requested to take one teaspoonful of table salt by mouth daily, along with the intravenous saline.

Case 2.—A woman, age 55, was first seen April 25, 1928. Purplish colored nodules, ulcerations and pustules had been observed on the calf of the right leg for ten months. She had been in bed for the previous six months and had been unable to sleep for several months unless she took some medicine for her nerves. I looked up the prescription and found that all it contained was bromid. All laboratory tests were negative. Bromids were found in the urine at the end of the first week. The patient was given 75 c. c. of saline every three days intravenously and was ordered to take at least one teaspoonful of sodium chlorid by mouth every twenty-four hours. She was completely healed in six weeks. She has put on considerable weight, is in good health again, and has had no recurrence.

Case 3

Patient was on bromids twenty-four days; lesions were eleven days developing to present size. Note lesions have granulomatous center and pustular border.

Case 3.—A woman, age 45, was first seen May 6, 1928. Physical examination revealed papulo-pustular and granulomatous lesions on both legs. The individual granulomatous lesions varied in size from a split pea to 3 cm. in diameter. A large ulcerated granulomatous plaque on the front of the left leg was 10 x 15 cm. and irregular in outline due to the coalescence of numerous lesions. On the right leg was a similar plaque 5 x 10 cm.

The patient denied that she had taken any medicine by mouth for several months. She did not return to me, but the next day I saw the physician who had been treating her and from him I obtained a history that she had been a morphin addict and was taking enormous doses of bromid in order to stay off morphin. Under my supervision, although I did not see her, she received 100 c. c. normal saline twice per week for ten weeks and was healed. She came back two months later with a return of same condition. Bromin was found in the urine after administration of saline.

Case 4.—A woman, age 58, was first seen May 22, 1928, with numerous pustules on the legs and feet and nodular granulomatous lesions on the legs, some 2.5 cm. in diameter. One ulcerating granulomatous lesion 7 x 15 cm. was formed by the coalescence of smaller lesions.

She had taken bromids for two or three years for headache and sinus trouble. Two years before she had similar lesions on her legs, but they soon healed. She had been kept on a salt-free diet by the family physician for some time. Laboratory work was negative to begin with. The test for bromin was positive after treatment was instituted. This is the most stubborn case of all. About the time that the patient appears well, new places begin developing. At one time a lesion increased to 7 or 8 cm. in diameter in two weeks, but responded readily to intravenous saline.

The patient has been receiving 200 c. c. of saline weekly and responds readily, to have a recurrence when treatment is discontinued.

Case 5.—A woman of about 60, seen September 1, 1928, had numerous pustular and granulomatous lesions on the front of the right leg. Some were 2 cm. in diameter, of six weeks' duration. She gave a history of a similar condition five years before. She had been taking medicine for fifteen years to control epilepsy. The medicine was examined and contained a large amount of bromid. Luminal was substituted for bromids to control the convulsions and one dram of sodium chlorid was given daily in addition to the usual amount of salt in her food. A letter from the patient ten days later said the condition had improved wonderfully.

Case 6.—A woman, age 24, was seen August 31, 1928. Physical examination revealed a conglomerate mass of acne-like papulo-pustular lesions extending over the bridge of the nose and on to each cheek. There was a mass about 3 cm. wide on the nose and 4 cm. wide on each cheek, and numerous acne-like papulo-pustules on the chin and forehead of two weeks' duration.

The patient gave a history of being extremely nervous for some time. Nervine was recommended by a neighbor and after she had taken it for about one week the present condition began. A Wassermann was negative. Bromin was present in the urine.

She was given 50 c. c. of normal saline intravenously every other day for fifteen times. All lesions completely dried up, leaving a stain. Improvement was noticed after two injections.

Case 7.—A woman, age 20, entered the City Hospital September 22, 1928. The chief complaints were pain in the abdomen, nausea, vomiting and headache. September 23, 1928, 60 grains of sodium bromid every four hours for twenty-four hours was prescribed by the attending physician. Five hundred c. c. of normal saline with 10 per cent glucose were given intravenously the same day.

September 24, 1928, she was given sodium bromid, 50 grains.

September 25, 1928, she was given sodium bromid, 40 grains.

September 26, 1928, she was given sodium bromid, 20 grains t. i. d.

October 3, 1928, the chart showed that the interne recorded furuncles on her extremities and back.

October 9, 1928, the Eye, Ear, Nose and Throat Service noted furunculosis of the auditory canal.

October 17, 1928, a dermatological consultation was obtained and the patient was found to have pustules over the entire body, pustules, furuncles and granulomatous nodules on the extremities, with a granulomatous lesion in the right auditory canal. A diagnosis of bromoderma was made. Bromids were discontinued and 50 c. c. of saline given on October 20, 75 c. c. October 21, 100 c. c. October 22, 125 c. c. October 23, 150 c. c. October 24, and 150 c. c. October 25. There was marked improvement and the patient was discharged October 25, 1928. She has never been back to the clinic.

This patient received bromids for ten days before cutaneous symptoms were observed. In fourteen days from the onset one lesion had developed to 5 cm. in diameter. The lesions regressed rapidly when sodium bromid was discontinued and saline given intravenously.

SUMMARY OF CASE REPORTS

(1) All seven patients were women.

(2) Two had been on a salt-free diet.

(3) Bromid was found in the urine of two patients before administration of saline.

(4) Response to sodium chlorid therapy was prompt. In five there has been no recurrence; in one recurrence with intake of bromids; in one recurrence without taking any more bromids. This patient had been on a salt-free diet for some time and was at the same time taking bromids.

(5) The general condition of all patients improved with administration of saline.

209 Medical Building.

DISCUSSION (*Abstract*)

Dr. Thomas W. Murrell, Richmond, Va.—It might be advisable to give the sodium chlorid along with bromid.

Dr. George M. MacKee, New York, N. Y.—Drs. Lancaster and Murrell mentioned a point that might well be emphasized, namely, the administration of sodium chlorid by mouth. It has been possible to cure a number of cases by giving one or two teaspoonfuls of the salt by mouth daily. Also it is often possible to continue the use of bromin in idiosyncratic patients when sodium chlorid is given daily by mouth, without effecting bromoderma.

Dr. Cosby Swanson, Atlanta, Ga.—In the treatment of bromoderma I find that if I give sodium chlorid internally and apply saline wet dressings to the lesions the results are practically the same as when sodium chlorid is given intravenously. In some cases this method is slower in its effect than the intravenous method, but this slowness is offset, as there is no risk.

Dr. D. C. Smith, University, Va.—Our Obstetrical Department is treating toxic vomiting of pregnancy by giving 60 grains of sodium bromid per rectum every four hours. This is a very effective method of treating vomiting and will probably become more widespread in its use. The majority of those doing obstetrics do not know much about bromoderma and for this reason the diagnosis is not being made promptly in all cases. I mention this because it might help in differentiating dermatoses associated with pregnancy.

Dr. Bedford Shelmire, Dallas, Texas.—If cases of bromoderma are to be treated by the oral or intravenous administration of sodium chlorid (ordinary table salt) with the hopes of displacing the deposited bromid salts, attention must be directed to the possible dangers of employing the iodized type of table salt for such purposes. To date we have seen in our office some fifteen unquestionable cases of iodid-acne of the face and scalp caused by the substitution of iodized salt for the ordinary table salt in the diet. Attention was directed to this in a short report by the author in the *Journal of the American Medical Association* of June 9, of this year.

Inquiry has shown that the iodized type of table salt is used exclusively in many hotels, dining cars, boarding houses and homes. If a patient is directed to take salt by mouth for the treatment of bromoderma, it is imperative that he be cautioned to avoid the iodized type of this salt. As many patients use this salt in their diet unknowingly, it is necessary to have them examine the label of the salt used in their homes, and to avoid the universally advertised iodized type of this condiment.

Dr. J. L. Kirby-Smith, Jacksonville, Fla.—I would like to call attention to three bromid eruption cases in my practice during the past five years, due to a well advertised patent medicine, "Capudine."

Dr. Lancaster (closing).—After the administration of saline the test for bromin in the urine was satisfactorily applied in all cases tested. I secured the aid of a chemist to help with the test and without his aid my results would never have been so favorable as they were. Much iodized salt is used in east Tennessee and for that reason I prescribe chemically pure sodium chlorid for oral administration.

SPONTANEOUS PNEUMOTHORAX IN CHILDREN UNDER TWO YEARS*

By BENJAMIN BASHINSKI, M.D.,
Macon, Ga.

The literature on spontaneous pneumothorax in infants and children contains only very meager information.

It has been my misfortune to find three cases of this condition in eight months in children under two years of age. My paper will be confined to two cases, as one came under my observation from Florida and had to return home within one week because of other very serious illness in the family. I have had several letters from the family, but have not examined the child since. From all reports she is doing well.

Both the patients that I shall discuss were proven by x-ray and autopsy to have pneumothorax. In neither case was paracentesis done before the diagnosis was made or after.

Dr. John Diven, in his chapter in "Abt's Pediatrics" on "Peculiarities of Disease in Childhood," says a pneumothorax is almost unheard of in early life.

Dr. Alan Moncrief, Medical Registrar of Middlesex Hospital, states that Bovaird, in 1903, recorded five cases and collected thirteen others from the literature of the previous ten years.

F. Elmer Johnson reported fifteen children under three years of age in the past sixteen years.

Harry Apfel noted one case in the *Medical Journal and Record* eighteen months of age. This was reported by Bourne in the *British Medical Journal.*

Dr. M. Jay Flipse, in the *Journal of the Florida Medical Association,* February, 1928, reported a case in a newborn infant.

According to Dr. Henry Heiman, the intrapleural space may be encroached upon by gas or fluid or both: first, from without through the chest wall, due to trauma or more frequently paracentesis; second, the air may enter through ruptured pulmonary tissue; third, the membrane may be intact and the air produced by an anaerobic gas producer; and finally the air may enter from below the diaphragm.

According to Dr. John Lovett Morse, pneumothorax in early life is more often due to perforation of the lung with an aspirating needle

*Read in Section on Pediatrics, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

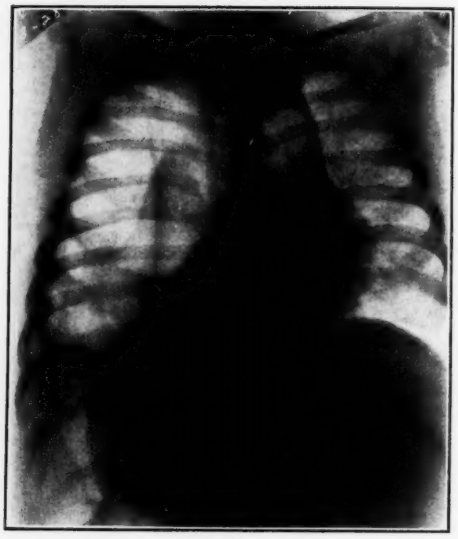

Fig. 1
(Dorothy A). Pneumothorax of left side. X-ray made January 3. Heart displaced to right almost to mid-clavicular line.

or trocar than to all other causes combined. Seldom is it due to a rupture of a caseous tuberculous focus.

Three kinds of pneumothorax are found, the open, closed and valvular: the open, where there is connection with the outside air, either through the chest wall or through a bronchus; the closed, where there is no such connection; and the valvular, which in a short time becomes closed, because of the accumulation of air in the pleural cavity which shuts the valve. If the pneumothorax is open, there is little enlargement of the affected side. If it is closed the affected side is considerably enlarged. The heart is always displaced. The percussion note is tympanitic when the pneumothorax is open and exaggerated vesicular when it is closed. There are usually no rales.

In neither of my cases was found the formation of an effusion either serous or purulent. Neither was due to perforation of the lung by an aspirating needle, fractured rib, or tuberculous foci, but both came from an active lobar pneumonia.

Dorothy A., age eighteen months, full term, the only child of healthy parents, had not had the usual diseases of childhood. There was no history of tuberculosis in the parents or grandparents. Her present illness began on Thanksgiving, 1927. Examination showed that the child had a typical case of lobar pneumonia.

Blood examination showed a leucocytosis of 36,300 with 82 per cent neutrophils. The urine contained a slight trace of albumin. The rectal temperature 105°, varying from this to 101° for eight days. On the morning of the eighth day the temperature dropped to 99°. During the afternoon, the mother called and stated that the child was blue, seemingly in acute pain, and that the respirations were very difficult. Upon examination at this time the pulse was found to be quite rapid and the respirations short and rapid; in fact, a marked collapse. The apex beat was heard over the right side, almost in the mid-clavicular line. The percussion note was very tympanitic. The coin sound was present. The child was admitted to the hospital and an x-ray of the chest indicated a pneumothorax of the left side. Respiration was embarrassed until the middle of February, when other pictures showed the lung to be filling again and a later picture showed it to be entirely filled. The child continued to improve and at the present time is in good health. Repeated von Pirquet tests were negative.

Chester B., a white boy fifteen months of age, was the only child of healthy parents. He was full term, had a normal delivery and weighed eight pounds at birth. He had measles at eight months of age and chicken-pox at twelve months. He had never had any of the respiratory diseases until the present illness.

The present illness began on April 2, with an ordinary cold and slight fever. The family physician was called and diagnosed the case as bronchitis. On the eighth day of the illness, I was called in consultation when a diagnosis of lobar pneumonia was made and the baby was admitted to the Macon Hospital on April 10.

The sclera were yellow. The pupils reacted to light and accommodation. The ears and nose were negative, and tonsils not enlarged.

The thorax was fairly well developed, expansion altered and limited over the right side.

On palpation, an increased vocal fremitus of the right side was elicited when crying. Percussion showed

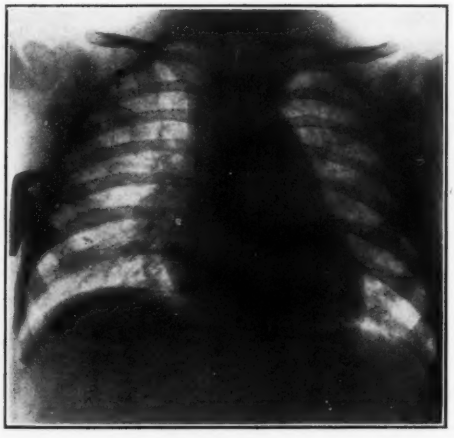

Fig. 2
(Dorothy A). Re-x-rayed April 27, showing left lung completely expanded.

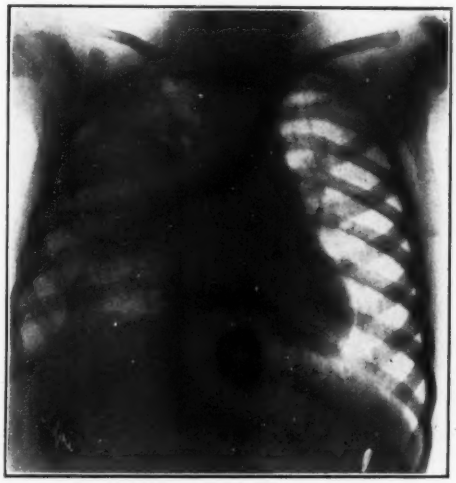

Fig. 3
(Tooke). Pneumothorax of right side. Adhesive bands at fifth and sixth rib, preventing total collapse.

dullness over the entire lung, both anterior and posterior, except of a small area at the apex.

Auscultation demonstrated tubular breathing over the entire right lung with multiple moist musical rales. There was no area of dullness or tubular breathing over the left chest.

The heart rate was very rapid and the heart was enlarged to the left, almost extending to the mid-axillary line.

The abdomen was slightly distended. No masses were palpable.

Genito-urinary examination was negative. The skin was moist and smooth.

Bones and joints were negative. Cervical and axillary glands were slightly palpable, and reflexes negative.

Upon admission the blood leucocyte count was 8,700, with 58 per cent neutrophils and 42 per cent small lymphocytes.

On April 13 the blood count was 7,150, with neutrophils 62 per cent, small lymphocytes 30 per cent, large lymphocytes 7 per cent, and transitionals 1 per cent.

Urinalysis on both days showed one plus albumin, and was otherwise negative. The von Pirquet test was negative.

Upon admission the rectal temperature was 105° F., varying from this to 103.4° until April 12, when it dropped to 100°. In the afternoon of April 13, the rectal temperature was 104.4°, dropping again to 99° on April 16. In the morning of April 18, the temperature was 103.8°, dropping to 99.6° in the afternoon.

At this time physical examination showed a very anxious facial expression, a marked limitation of expansion on the right side, and a tympanitic note over the entire right side. The coin sound was present and a diagnosis of right pneumothorax was made.

X-ray examination was ordered, and the report was: "Cardiac hypertrophy and pneumothorax of the right side."

The baby gradually grew worse and died on April 23, at 11:50 p. m. Autopsy was performed by Dr. Thayer at 1:00 a. m., with the following report:

Post-Mortem No. 19.—Chester B., 15 months old, died April 23, 1928, at 11:50 p. m. Post-mortem was held April 24, 1928, at 1:00 a. m.

The body is that of a well-nourished male child. It is still warm. There is no rigor mortis. The superficial nodes in the groins and axillae are slightly enlarged and firm. The pupils are small and equal. The right side of the thorax and upper abdomen are distended, and the percussion note over this area is high and tympanitic.

Abdomen.—The peritoneum is clear and transparent. There is no fluid in the cavity nor any inflammatory exudate. The lymph nodes of the mesentery and behind it are swollen and edematous. The upper border of the liver in the mid-line is at the xiphoid articulation. The lower border of the right lobe is at the pelvic brim. Both kidneys show a larger field than normal. The diaphragm on the right side is at the seventh space; left side, at the sixth rib.

Thorax.—On puncturing the right pleura in the right anterior axillary line under water there is a large escape of gas bubbles. Opening the thorax, the right pleura is seen to be covered with a pyogenic membrane and is intensely congested over both the parietal and visceral layers. The lung is completely flattened against the tissues of the middle mediastinum, the spine and the pericardium. There is no fluid in either side and there are no adhesions between the two layers of pleura. The left lung is much inflated, of a light color, mottled with a small darker area. There are

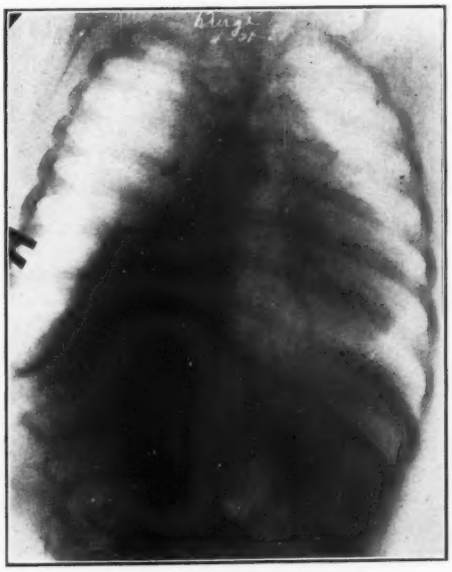

Fig. 4
(Chester B). Pneumothorax of right side. Heart displaced very much to the left.

no fluid or adhesions on the left side. The lobes of the right lung are tightly adherent to each other by recent purulent fibrin, and on careful separation a number of large abscesses are found in the lower and middle lobes, many of them just beneath the pleura. In the hilum, on the upper posterior aspect of the apex of the lower lobe, there is a small area of hemorrhage beneath the pleura, close to an abscess, where the pneumothorax apparently occurerd by rupture of the serous membrane. The tissues of the lung, where not occupied by abscesses varying from 1-2 mm. to 3 cm. in diameter, are atelectatic. The bronchi are filled with frothy fluid; their mucous membranes are not congested or inflamed. The left lung is congested and edematous throughout; there are no areas of consolidation, no abscesses as in the bronchi on the right side.

The heart is larger than normal; its apex is blunt; both ventricles are dilated; the valves are normal, but the myocardium is pale and cloudy.

Abdominal Organs.—The spleen is a little large, much congested, and of firm consistency; the lymphoid follicles are clearly visible, but not enlarged. The adrenals are normal in the gross. The kidneys are of normal size, capsules not adherent, surfaces pale and mottled, cortices swollen, lobules wide and irregular in contour, glomeruli prominent, pelves normal. The pancreas is normal. The stomach contains a large amount of coagulated milk, and its mucosa is in functional hyperemia. The duodenum is normal; the common bile duct is pervious. In the small intestine the Peyer's patches are all distinctly congested, and a few of them are slightly edematous; the rest of the intestinal wall is pale, covered with slightly bile-stained mucus. In general the canal is empty except for some curd and bile in the cecum. The liver shows some degree of passive congestion and its markings are indistinct. The gall bladder is distended with greenish bile. The pelvis and organs are apparently normal. The head was not opened.

The causes of death were: multiple abscesses of the right lung; right pneumothorax; general purulent dry pleurisy of the right side; cloudy swelling of the heart and liver; and acute parenchymatous nephritis.

Bacteriology.—Fresh smears and broth culture from an abscess of the lower right lobe showed pneumococci in pure culture.

DISCUSSION (*Abstract*)

Dr. Joseph Yampolsky, Atlanta, Ga.—In the past we have thought acute pneumothorax in children was not common, and that when it did occur most of the patients died. It is interesting to see that Dr. Bashinski has been able to report two cases that recovered. He has given no specific treatment. Many of these cases are not reported because they become ill so quickly that we are not able to take them to a hospital. I believe acute pneumothorax is more prevalent than we have thought.

Dr. John A. Foote, Washington, D. C.—You can examine the large systems of pediatrics and also the smaller text books and find very little on pneumothorax. We should avoid the term "spontaneous pneumothorax," because it is not spontaneous. We might as well speak of spontaneous pleurisy. The condition is due to establishment of communication between the outside air and the intrapleural space. The mortality of this condition is given by various authors as ranging from 30 to 50 per cent. That, of course, is a wide range. The mortality depends more or less upon the cause of the condition and upon the age of the individual. It is uniformly higher in infants than in older children. Dr. A. J. Scott, of Los Angeles, reported five cases of this condition at the last meeting of the Section on Pediatrics of the American Medical Association. All were under five years of age, and all survived. In young children, particularly, the prognosis is bad.

In the older child, again, pneumothorax may be used as reported by Armand de Lille, as a conservative measure. We must perhaps come to the conclusion that pneumothorax in the infant is a dangerous condition, while pneumothorax in the older child, occurring as a complication of pulmonary tuberculosis, may be really a conservative condition.

Dr. J. Mac. Bell, Mobile, Ala.—I have recently seen a case of acute pneumothorax in a young infant, diagnosed by x-ray. The condition developed after the child had apparently recovered from lobar pneumonia. It apparently cleared up later.

Dr. Bashinski (closing).—I had the opportunity of seeing several cases of pneumothorax in adults while stationed at camp. I tried to profit from this experience by keeping these little patients quiet. So far as the treatment is concerned, I kept them quiet, using opiates when necessary. In one case I had an opportunity to observe how much time elapsed before the blood was absorbed after being given intraperitoneally. The blood was given Sunday afternoon at 3:30, the amount being 50 c. c. On Monday morning when the autopsy was performed, all the blood had been absorbed.

As was stated, the condition is very rare in children.

RESECTION OF PROSTATE GLAND OBSTRUCTIONS WITH STERN'S RESECTOSCOPE EQUIPMENT*

By T. M. Davis, M.D.,
Greenville, S. C.

Since 1874, when Bottini first introduced his cautery operation for the relief of obstructions at the vesical orifice, it has been the endeavor of urologists to devise a minor surgical procedure for removing obstructions in this position, instead of using the more serious major operations.

Bottini's instrument did not meet with any degree of popularity until 1897, when Freudenberg presented a greatly improved instrument. This was later improved again by Young, who used it with considerable success for several years. There was still much to be desired, as visualization of the operative field during the operation was impossible, and this alone caused numerous operative errors, which caused the instrument to fall into disrepute.

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*Read in Section on Urology, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

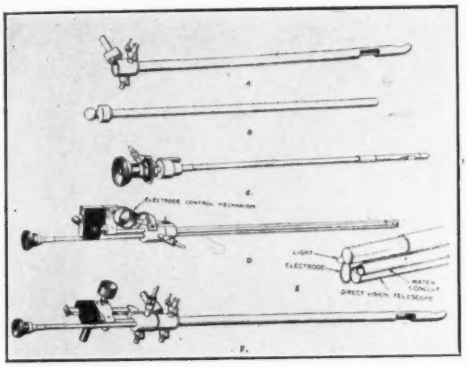

Fig. 1

A, B, sheath and obturator; C, examining telescope; D, working parts, consisting of direct vision telescope, water conduit, light carrier and cutting loop; E, end of working parts enlarged; F, instrument assembled; loop may be seen in fenestrum. (Courtesy Dr. M. Stern.)

Young, in 1909, designed and began the use of his punch instrument, which was composed of an endoscopic tube with a fenestrum near the beak and an inner tube sharpened on the end capable of excising any tissue projecting within the fenestrum. Young, in 1911, designed and used a cautery blade for cutting, as hemorrhage was frequently considerable and often difficult to control with the simple punch instrument. The cautery was not so successful as was hoped, since subsequent sloughing and secondary hemorrhage were still encountered.

Although Caulk, Tolson and others have made improvements in this instrument, it remains substantially the same, with the disadvantages of the simple endoscopic tube, with limited illumination and visualization of the condition at the vesical orifice before and during operation. In using the cautery blade for cutting, visualization is impossible during active operative manipulations, when it is most desirable. In addition, the use of the cautery current is far from ideal for various other reasons, either for cutting or for the control of hemorrhage.

Collings several years ago resected with excellent results a number of vesical neck obstructions by means of radiothermy current. Oil had to be used as the distending medium to prevent sparking and fulguration. Collings later, in cooperation with the Wappler Electric Company, developed the electrotome, which develops a current of high frequency and does very nice cutting of tissue under water with the proper electrodes. It is very slow and time-consuming and does not permit the extensive resection usually necessary.

Dr. Maximilian Stern, in cooperation with the Wappler Electric Company, has developed a machine for generating a current of very high frequency and low voltage, using the thermionic pliotron tubes. This current is peculiar in that it can be delivered in a continuous flow through a cutting loop under water. As it has no tendency to arc or jump across a gap, it is possible to employ a bipolar instrument for its application. The absence of sparking eliminates all fulgurating effects, with their subsequent sloughing and secondary hemorrhage.

This current is applied through an ingenious instrument called the resectoscope, the component parts of which consist of a sheath with a fenestrum five-eighths inch in length near the beak, an obstructor to aid in its introduction, and an observation telescope. The working parts consist of a direct vision telescope, a light carrier, a water conduit and a cutting loop or active electrode (the sheath carries the receptacle for the inactive electrode).

The loop is made of tungsten wire 0.5 cm. in diameter, placed at right angles to a specially insulated shaft, which is connected to the instrument in such a manner as to be made to slide backward and forward within the fenestrum by means of a rack and pinion. The loop, though small, actually removes more tissue than its size would indicate. The loop is situated just in front of the direct vision telescope and may be seen resting upon the tissues protruding into the fenestrum prior to its resection and may

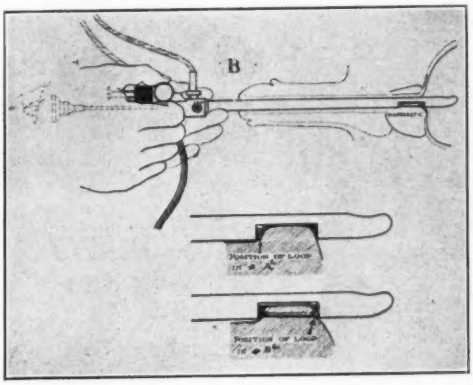

Fig. 2

Instrument in operation. B shows instrument in urethra, enlarged cuts, upper tissue protruding within fenestrum, loop resting upon tissue. Lower loop has passed through tissue. (Courtesy Dr. M. Stern.)

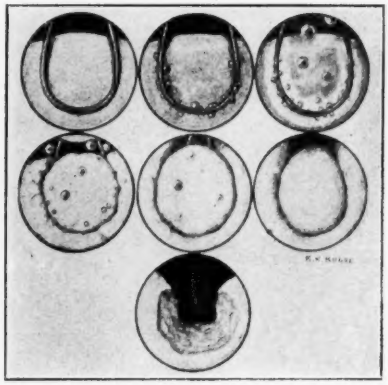

Fig. 3
Cutting loop as seen through direct vision telescope in various stages of operation, resulting in gutter formation. (Courtesy Dr. M. Stern.)

be observed throughout the entire excursion during the operation.

The exact way in which this current performs is not definitely understood. It is thought that the current jostles the cell molecules so violently by its rapid oscillation that it causes a rupture of the tissue cells. In many sections the current removes the tissue without hemorrhage. At times vessels are severed which continue to bleed and require special treatment for control of bleeding. The author's method for the control of hemorrhage will be discussed in detail under operative technic.

The anesthesia of choice is caudal or sacral. This is easily given, is safe in the type of patient usually encountered for this work, gives ample anesthesia to the prostate and posterior urethra, with relaxation of the perineal muscles allowing free movements to the instruments, and permitting an operative procedure without pain or shock. Resection can be accomplished with only instillation anesthesia in bars and contractures. The former is preferable.

The operative technic is as follows: the sheath is introduced, the obturator is withdrawn and the bladder irrigated with sterile water until the medium returns clear (continuous irrigation is necessary in some cases on account of hemorrhage). The bladder is filled with about 200 c. c., the observation telescope is inserted and a careful study is made of the vesical neck and posterior urethra. The tissue to be removed is determined and the telescope is replaced with the working parts with all conducting cords attached. The tissue to be removed first is made to engage within the fenestrum (preferably the vesical aspect). The loop will be seen resting upon this tissue. The current is turned on with a foot switch, and in about five seconds bubbles will begin arising from around the loop and a halo will be formed where the loop comes in contact with the tissues. The loop is advanced slowly through the tissues the entire length of the fenestrum. This leaves a clear gutter with only slight surface discoloration, if any, usually without hemorrhage. A small artery may be severed which continues to bleed. This occurs more frequently in lateral lobes. Repeated sections are made until hemorrhage interferes with clear vision (using continuous irrigation when necessary), or the required amount of tissue is removed. If hemorrhage interferes with clear vision it is controlled by a method to be described presently, and resections are repeated until the required amount of obstructing tissue is removed. It may be necessary to control hemorrhage several times during extensive resections.

In median bars and contractures, sufficient parallel sections should be removed from the floor of the sphincter completely to remove the obstruction. In lateral lobes which encroach upon the posterior urethra numerous sections are removed from each lobe, beginning near the floor of the urethra at the vesical aspect, making a section. Additional sections are made in a continuous line, having the proximal edge of the preceding section in view at the distal end of the fenestrum, remembering that three-fourths inch is removed at each section. The verumontanum may be used as the anterior guide. Nu-

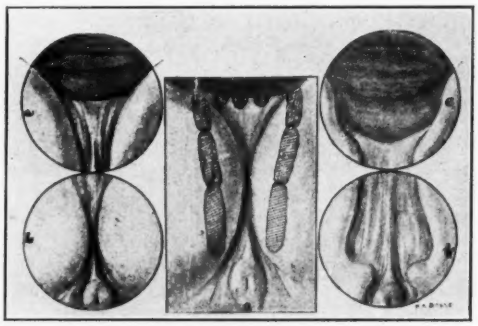

Fig. 4
Artist's sketch of prostate. a, lateral lobes vesical aspect; b, lateral lobes encroaching upon posterior urethra; c, diagram showing lateral sections, several sections in floor of sphincter; e, ef, vesical and urethral views showing reduction of encroachment by lateral lobes. (Courtesy of Dr. M. Stern.)

merous parallel lines of sections are made in the obstructing tissue on each side until the obstruction is completely relieved, resecting one side at a time.

In malignant conditions this method is used only as a palliative measure to relieve the obstruction and give the patient the ability to empty the bladder through the natural passage without the discomfort of permanent suprapubic drainage. With radium implants, rectal irradiation and deep x-ray therapy, it has given the author results that compare very favorably (the short length of time since initial treatment considered) with those obtained by any other of the more radical operations.

The author wishes to discuss hemorrhage and the methods of dealing with it which he has tried. The first method was to sear the bleeder slightly with the loop electrode connected with diathermy. A special adapter was designed and a Collings electrode knife was used with diathermy current. These two methods were not satisfactory. A cystoscope with a Bugbee electrode using diathermy current coagulated the vessel area. This method necessitated the entire removal of the resectoscope and the introduction of the cystoscope. To obviate this, the writer designed an additional telescope to be used through the Stern's sheath, which instrument he presents today. This consists of a right-angled telescope with a light carrier, a water conduit, a deflector and a channel tube for the passage of a Bugbee electrode, the telescope being interchangeable with the working parts of the resectoscope.

To control hemorrhage, this telescope with a Bugbee electrode in place connected with one pole of a diathermy machine (the other pole of the diathermy machine is connected with a 6x8 inch tin foil plate previously placed under the patient's buttock) is introduced into the sheath. The water conduit is connected with an irrigating reservoir. Using continuous irrigation, the bleeding vessel is located, the tip of the electrode is placed on the vessel and the diathermy current turned on with a foot switch for about two seconds, using 600 milliamperes diathermy current. This coagulates only the small vessel area, absolutely controlling the hemorrhage. All bleeding vessels are controlled. If sufficient tissue has not been removed, the telescope is replaced with the working parts of the resectoscope and additional sections are made. It may be necessary to control hemorrhage several times during extensive resections. All bleeding vessels are controlled before the operation is considered complete. This method accurately controls all hemorrhage. Secondary hemorrhage has not been encountered in the author's series of cases.

The preparation of patients for resection is the same as that usually employed in all types of obstruction, namely: forced fluids, good general diet, alkalies when indicated, relief of retention with catheter drainage in cases of complete retention or very large residual urine and evidence of decompensation of kidneys and generally poor physical condition. Various laboratory tests are made to determine the renal impairment and an attempt is made to restore this to as near normal as possible. Patients can be resected in a more inferior physical condition than is permissible with major operative procedures.

In lateral lobe involvement (except the fibrous type), it is advisable to give a course of deep roentgen therapy consisting of a series of four units. These may be given in half or full unit doses, the former every other day, the full unit twice weekly. The exposures are a suprapubic, a perineal, a sacral and a rectal. The maximum results from this course of treatments will be seen in about six weeks. There is a reduction

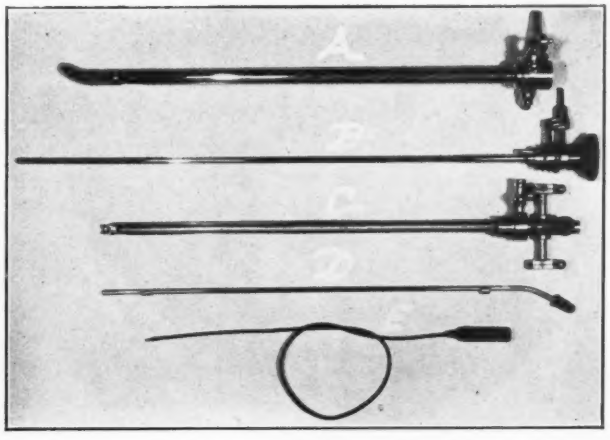

Fig. 5

Component parts of author's instrument for the control of hemorrhage. A, resectoscope sheath; B, right angle vision telescope with light carrier; C, electrode deflector and water conduit; D, electrode conduit; E, Bugbee cold cautery electrode.

of the inflammation of the mucosa, with improvement in the amount of obstruction, and in many cases a reduction in the gland tissue itself with a notable reduction in the amount of hemorrhage at operation.

Many cases void freely within several hours following the resection and continue to do so. There is some inflammatory reaction with edema, causing difficulty after twenty-four hours, which may persist for several days. This is more noticeable in the lateral lobe cases and may require the use of a retention catheter until the immediate edema of the tissues subsides, which usually occurs in three or four days. Upon removal of the retention catheter the patients void freely with a large forcible stream, which improves as the reaction gradually subsides.

Stern has called attention to the pathological work of Greene, Brooks, Ciechanowiski, Tannenbaum, Fisher, Ewing and others in the support of the theory that prostatic enlargement is for the most part an inflammatory one and not a true adenoma. Statistics reveal that one-third of all men past fifty have prostatic enlargements. There is certainly no other gland in the body in which tumor occurs with such frequency. Adenoma of a gland usually departs from the histological structure of the gland in which it occurs. In prostatic adenoma or hyperplasia there is always evidence of prostatic tissue. Histologically it appears as an inflammation. In most cases we see enlarged acini lined with flattened epithelia and round cell infiltration of the stroma, with increased connective tissue formation.

A large number of individuals have prostates which are infected either venereally or nonvenereally. The infection is frequently insidious for years when untreated, causing an overgrowth of the prostate gland tissue.

Young, Caulk, Stern and others have been instrumental in demonstrating the fact that the hypertrophied prostate can be influenced to undergo retrogressive changes. All operators who are familiar with the two-stage prostatectomy know of the marked shrinkage in large prostates which regularly occurs in the interval between cystotomy and actual enucleation. Caulk and Stern have repeatedly reported marked reduction in the size of the gland following resection of the sphincter and lateral lobes. Caulk states: "One is never justified in doing either a suprapubic or perineal section for the removal of bars and contractures." He reports that 40 per cent of all cases of obstruction observed by him are amenable to treatment by his technic. I believe that with the armamentarium and technic described in this paper, a very large majority of all types of obstruction at the vesical orifice can be successfully relieved. I have resected 51 consecutive cases observed in my practice with uniformly excellent results. Many of these cases have been followed for a period of one and one-half years. Only the malignant cases have required subsequent resection to continue the relief from obstruction, as determined by cystoscopic examinations, amount of residual urine, relief of symptoms and absence of infection.

The permanence of my results I believe will compare favorably with those of the more radical procedures. Since 1901, when suprapubic prostatectomy was introduced, to be adopted throughout the world with a high degree of success, it has been taken for granted that by means of this operation all hyperplastic prostate gland tissue was enucleated. It has been proven beyond doubt that prostatic enlargement does recur, probably more often than is commonly supposed.

There are a number of publications confirming this fact. Wallace, Albarran, Motz, Parearnau, Takahashi and others are of the opinion that this method did not always succeed in removing all the affected gland substance. Hedinger reported definite recurrences found at autopsy in cases two and five months after prostatectomy; Honegger, in a case four months after prostatectomy, Blum in cases of longer duration, and many other cases have been reported. I have observed a number of recurrences in my brief span of practice. Quite recently a case in which prostatectomy was performed

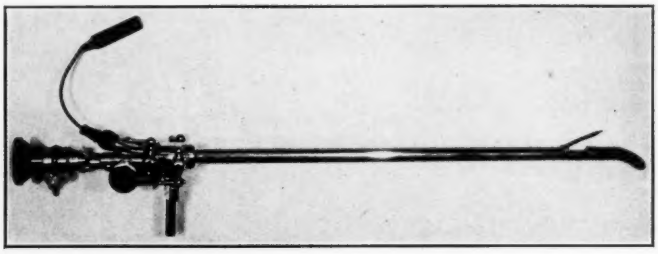

Fig. 6
Author's instrument assembled and inserted within resectoscope sheath. Notice fulgurating electrode projecting from fenestrum.

four years ago previously by a competent operator showed well defined lateral lobes with a small anterior lobe. Several cases recently resected by me had well defined lateral lobes on one side which had recently been subjected to prostatectomy. These were either recurrences or overlooked at operation.

I wish to urge the routine use of the cystoscope, both the oblique and retrograde lens system, in the examination of all vesical neck obstructions. Its use gives the most accurate details of the true condition present. Without cystoscopy numerous errors in diagnosis are frequently made. Rectal palpation is an aid, but should never be depended upon alone in determining the presence or type of obstruction. It is invaluable in combination with the cystoscope in the urethra in determining contractures of the vesical neck. I have observed many cases wrongly diagnosed as obstruction by rectal palpation alone; also many cases which were not diagnosed when obstruction was present. Especially is the latter possible with median bars and contractures. In cases undergoing catheter drainage and preliminary treatment preparatory to resection, repeated cystoscopy and rectal examination are very important in determining the proper time for operation. Patience and perseverance are often necessary in these cases and the rewards are unusually great to those who persist.

Time alloted for the presentation of this paper does not permit detailed case reports. I, therefore, classify my cases in groups for brevity. The total cases resected to date are 51. The clinical results have exceeded all expectations. The symptoms of these cases were in proportion to the degree of prostatic enlargement and acuteness of the inflammation. In general, these were dysuria, frequency, residual urine and retention with or without incontinence. The residual varied from 100 to 1,600 c. c.

In this series of 51 cases there were eight cases of contracture of the sphincter without appreciable lobe involvement. These cases had dysuria, frequency and hesitancy. The largest residual was 200 c. c. Complete relief was obtained.

Of eleven cases with median lobe enlargement, three had very large mid-lobes with complete retention. The entire mid-lobes were resected. The results are all that one could desire: complete relief of obstruction and reduction of the residual urine to less than one ounce in all cases.

Of five cases of unilateral lobe enlargement, two had recently had a prostatectomy without complete relief of symptoms. This group had the usual obstructive symptoms with residual urine varying from three ounces to complete retention (three cases). One had a suprapubic sinus draining urine. The obstructing lobe was completely resected in each case. The results were excellent. All cases were symptomatically relieved. One of these cases has a residual urine of one ounce; the others have less than one ounce.

In twenty-one cases of bilateral lobe enlargement, the residual urine varied from four ounces to complete retention. Several had incontinence of residual urine, six had median lobe enlargement in addition to lateral lobe. The results in all except three were excellent with complete relief of symptoms and a reduction of the residual to less than one ounce. In three of the cases it was necessary to repeat the resections to obtain a satisfactory result as insufficient tissue was removed at the initial operation. These cases are now free from residual urine.

Of seven cases of carcinoma of the prostate, five obtained complete relief of obstructive symptoms and have remained free from sufficient obstruction to require additional relief. Three of these cases had advanced lesions with metastasis in the pelvis. Two of the seven cases had extensive metastasis. The rapidity of the growth has required additional resection for relief from obstruction. All carcinomata have received radium, either by implants and rectal irradiation, or both with deep roentgen therapy. There has been a noticeable reduction in the size of the pelvic metastasis, also some reduction in the size of the prostate. The ultimate result will probably be as in all other carcinomata of the prostate which I have observed. The patients will not have suffered the great discomfort that was the unfortunate fate of the others treated with radical operations.

In conclusion, the rectoscope is an instrument of wonderful possibilities, which gives excellent illumination and visualization of the operative field during resections and reduces resection to the accuracy of cystoscopy as to the site and amount of tissue removed.

The occurrence of hemorrhage is not to be feared. This may be accurately and successfully controlled with the author's interchangeable telescope and technic described in this paper.

Rectal palpation alone should never be con-

sidered sufficient for making a diagnosis of prostatic obstruction. It is often misleading. Cystoscopy gives more accurate interpretation of vesical neck obstructions.

Tissue removed shows only slight cellular changes at the edges of the section and permits accurate pathological study of each gland resected.

Obstructions of the vesical orifice can be adequately relieved by resection, which is a minor surgical procedure with far less danger to the patient than the more serious major surgical operations.

I am deeply grateful to Mr. Reinhold Wappler, of the American Cystoscope Makers, Inc., for carrying out my suggestion in making the interchangeable telescope used for the control of hemorrhage.

DISCUSSION (*Abstract*)

Dr. H. W. E. Walther, New Orleans, La.—I wish to ask Dr. Davis a few questions. What anesthetic does he use, and what is the average time required for the procedure? Does he use diathermy instead of the electric knife, and do the subsequent sloughs, when they come away, give any trouble?

I am one of the few who have as yet failed to see the light regarding these instruments for intravesical removal of prostatic enlargements. I have used the method of burning away small medium lobes through the cystoscope, but my difficulty has been that I sometimes have alarming hemorrhage when the sloughs come away. I can go back with the cystoscope and various electrocautery tips and try to stop the hemorrhage, but I often find that the electric spark stops the hemorrhage one day and the next day the man is bleeding as much as ever. I do not know whether I have accomplished enough good with the electric tip to pay for the trauma of putting it in place. I have yet to see an instrument that strikes me as being quite so scientific as the one Dr. Davis presented this afternoon. I think the work originated in New York. I am glad to see a Southerner trying to perfect it.

Dr. Thomas D. Moore, Memphis, Tenn.—There is at least one outstanding advantage in the procedure described by Dr. Davis, and that is its application in benign hypertrophy with large obstructing lateral lobes. The ordinary prostatic punch, either the cautery type or excisor, are not adaptable to cases of lateral lobe obstruction, nor is the more recent Collings knife. Occasionally one sees a patient with this type of obstruction who for some reason can never be converted into a good risk for prostatectomy. In this class of cases the operation Dr. Davis has described may be a very desirable and efficient means of treatment with a minimum of risk.

Dr. S. J. R. Murchison, Fort Worth, Tex.—When Dr. Stern first presented this instrument I became interested, visited New York and spent some two months there watching the work of Dr. Stern and Dr. Collings, and I found that they were treating a number of cases with the Stern instrument with very severe hemorrhage. Several patients were brought into the general hospitals with hemorrhage, which terminated fatally. This modification of the Stern technic, I think, will overcome a very serious objection to the original Stern instrument.

In one case in which I used the Collings instrument I had an unusual result. It was a case of a fibrous bar in which the bar was excised with the electrotome. When the catheter was removed the patient failed to void, much to the disappointment of both the patient and myself. We inserted the cystoscope and found a band of tissue attached to a small nodule which was posterior to the verumontanum. We directed a strong stream of water against this band and saw that it had a very large vascular supply, and was undermined so that it waved back and forth in the urethra. This band, passing over the rise of the bar, had persisted so that when the man attempted to void it blocked the urethra like the wadding in a muzzle-loading gun.

Dr. Davis (closing).—I regret that anyone was led to believe that I am using the diathermic current for resecting tissue. I use the original Stern resectotherm current for resecting the tissue, removing as many sections as desired. I use the diathermy current only to control the hemorrhage, coagulating the small vessel area. I do not believe there is any sloughing of importance and I have not had any secondary hemorrhage. I resect all cases in my office and hospitalize them for several days following the operation. Routine urinalyses showed absence of red blood cells in several of these cases in specimens voided the morning following the resections.

I prefer the use of caudal anesthesia produced by 3 per cent novocain solution injected through the puncture into the sacral canal. Low spinal anesthesia may be necessary in some cases of abnormal sacral canals. The time required for resections depends upon the type of obstruction to be relieved. In median bar and contracted vesical neck only a few minutes are required. In some lateral lobe cases it has required as long as two and one-half hours to remove enough tissue to give relief. So far my fifty-one cases are all satisfactory. My most successful cases have been in the hospital only three days, some as long as two weeks because of fever, bad heart, or other complications.

In New York I observed both Dr. Stern's and Dr. Collings' methods and I had a Collings machine. It will do resections in median bars and contractures of the vesical neck. It is very slow and I have not the patience to work with it. I prefer the more active Stern's method.

A case of interest was one in which I resected the lateral lobes, left a retention catheter *in situ* and allowed the patient to go home to return in a day or so. After two and a half weeks he came in with the complaint that he could void only in the recumbent position. Cystoscopy revealed a ball of very tenacious mucus, which was too large to remove with cystoscopic rongeur. Diathermy was tried with the hopes of disintegrating the mass, but without success. Recalling the visit of a detail man of the American Ferment Company in which he dissolved a milk curd with caroid powder, I decided to give this a trial. Three ounces of a 15 per cent solution were instilled into the bladder and left for thirty minutes. The bladder was repeatedly irrigated with sterile water, completely removing the mucus which had been dissolved. The patient has been free from symptoms to date, voiding freely in all positions.

EXPERIMENTAL LIGATION OF ONE URETER, WITH SIMULTANEOUS DECAPSULATION OF THE KIDNEY ON THE SAME SIDE*†

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The work reported in this paper constitutes the third group of experiments in a series of researches upon the ureter. In the first group, simple ligation of one ureter[1] was taken up; and in the second, unilateral intraperitoneal division of this tube.[2] The immediate objective of the present group of experiments, which is a study of the role of renal capsular anastomosis in the development of hydronephrosis and renal atrophy, was suggested by an observation made by the author[1] of the first two papers in this series that

"Perirenal anastomoses do not seem to favor the development of hydronephrosis, for adhesions were much more common in my atrophy series than in most of the hydro- and pyo-nephroses."

It has been shown by Tuffier and Lejars[3] that the fatty capsule of the kidney contains a rich venous plexus which communicates with the renal circulation by several routes. One of the latter is by means of capsular branches which pierce the cortex of the organ. Sampson[4] showed by injection of the renal artery at necropsy in human cadavers with a solution of gelatine colored with ultra-marine blue that a free arterial anastomosis exists about the lower pole of the kidney between the branches of the renal artery supplying the capsule and the branches of the ovarian artery. The ovarian artery then anastomoses with the uterine and the latter with the vesical arteries. Also by injecting the internal iliac artery, the fluid reached the capsule of the kidney. That this collateral circulation is important is evinced by the fact that if the renal vein is gradually occluded so that sufficient time elapses for the establishing of the compensatory development of the collaterals, normal renal function can remain.[5]

The capsule and capsular anastomosis have been given a prominent place in the mechanism of hydronephrosis by some authors. It has even been stated that the elasticity of the capsule was one of the important factors in the reduction in size of a distended kidney due to sudden closure of the ureter.[6]

However, the effect of the mere mechanical presence of the capsule on the outcome of the kidney is, most probably, negligible in comparison with the effect of the capsular circulatory changes that take place.

Lindemann[7] ligated the ureter in six dogs with the result that primary renal atrophy developed in three cases and hydronephrosis in the others. He found that the urinary back-pressure obstructed the vessels at the hilum and also the venous capillaries. In compensation for this, the capsular collateral circulation had enlarged in three instances and these were the ones in which hydronephrosis had developed. From these experiments he advanced the theory that hydronephrosis depends for its development upon capsular anastomosis. No importance was attached to the fact that two of the animals with hydronephrotic kidneys were sacrificed at forty-one and fifty-two days, respectively, while two of the animals that were found to have atrophic kidneys were kept 286 and 302 days, respectively.

There is nothing to prove that an enlargement of the capsular collaterals did not occur early in case of the animals kept the longer time. Furthermore, it has been shown that after ureteral ligation alone one cannot expect to find diffuse renal atrophy until sixty days or more have passed.[1] Had Lindemann kept his forty-one and fifty-two-day dogs as long as the other two mentioned, secondary atrophy with a shrinkage of any enlarged capsular collaterals might have taken place.

The results outlined above have been confirmed by the work of other investigators. Barney,[8] in particular, destroyed the capsular collateral circulation along with ureteral ligation in two dogs and killed them fifty days later. Primary renal atrophy had developed in one and a beginning atrophy in the other. How early the atrophy began was undetermined, but the added procedure of destruction of the collaterals (not used by Lindemann in his six dogs) seems to have hastened the appearance of atrophy. Upon the basis of this work, the claim was made that atrophy appeared invariably when capsular anastomosis was not established.

On the other hand, it has been held that capsular anastomosis is not a causative factor in the production of hydronephrosis. Scott[9] ligated the ureter and destroyed the renal collateral circulation in two dogs. In order that no capsular anastomosis should develop, he surrounded the kidneys with a gutta percha sac. Hydronephrosis was demonstrable at the end of seven days in one kidney and twenty-two days in the other.

The contrasting results of Scott and Barney may be due to differences in the periods of ureteral occlusion, for it is thought by some (Hinman and Hepler[10]) that destruction of the venous collateral circulation accelerates the rate of development of hydronephrosis in the early

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period and that secondary atrophy develops later as a result of great venous occlusion due to lack of collaterals. But even the evidence regarding the effect of the destruction of venous collaterals upon the rate of development of hydronephrosis is not all in agreement. In a small number of rabbits in which he could not make definite conclusion, A. E. Belt (working in the laboratory of Hinman and Hepler) found no difference in the rate of development of hydronephrosis over a control series in rabbits in which the venous collaterals had been destroyed.

Some writers claim that the procedure of decapsulation of the kidney makes conditions favorable for vascular anastomosis, whereby the nutrient circulation to the kidney is increased. Although this may be true at first, the formation of cicatricial tissue with fibrous contraction may interfere with the circulation at the cortex and at the hilum. Moreover, one might reason that whether the kidneys have a capsular circulation or not would make little difference, since practically all of the blood is brought in by the renal artery entering at the hilus.

From the various results obtained and the different views taken, we think a further study of the role of renal capsular anastomosis after ligature of the ureter is warranted. The method used in the present series of experiments, we have reason to believe, has been investigated experimentally, but we can find no report of such work in the literature of the last twenty-five years, as catalogued in the *Index Medicus*.

EXPERIMENTAL WORK

Technic.—This was aseptic in every detail. Ether was employed exclusively as the anesthetic. Twenty of the operations were made by the extraperitoneal route and thirty-one transperitoneally. When it was desired to place the ligatures close to the renal pelvis, the extraperitoneal method was used. For points midway of the ureter and close to the bladder, the transperitoneal procedure was employed. We have no evidence to show that one route is better than the other as far as local results or mortality are concerned. The incisions averaged about 5 cm. in length and were made either in the mid-ventral line or in the lumbar region close to the spinal column.

In each case the ureter was carefully dissected from its bed for about 2.5 cm. and ligated in two places, about 2 cm. apart, with medium cotton twist. No effort was made to dissect the ureteral artery from the ureter; thus both were ligated together. In the first twelve cats the obstruction was produced by merely placing two ligatures as described above, care being taken not to draw them too tightly. In the remainder of the animals about 0.5 cm. of the ureter was resected between the ligatures. This was done because in one of the earlier cats we found that the lumen of the ureter had been restored around the ligatures on the side opposite the knots. In thirty-four of the cats the ureter was ligated as closely as possible to the pelvis of the kidney; in fourteen, about midway between the bladder and kidney; and in three, as near as possible to the bladder. These three positions were used with the theory of J. Bell in mind, that "The higher the obstruction the greater the probability of hydronephrosis."

Decapsulation of the kidney was accomplished by incising this tunic with a scalpel, shelling out the organ and folding the capsule back to the hilus. No sutures were needed to retain the capsule in this position. Some trouble from cortical hemorrhage was experienced with this procedure at first, but we found that by carefully pricking the capsule with a needle and widening the break with blunt scissors, decapsulation could be performed with minimum bleeding.

The abdominal wound was closed in two layers. Continuous sutures of chromicized catgut or fine cotton thread were used in the muscle and fascia in the extraperitoneal wound or in the peritoneum, muscle and fascia in the mid-ventral incision. Medium cotton twist was used exclusively in the skin. Tincture of iodin was applied and no dressing was used.

The animals were observed daily and once a week a critical examination was made of each one. Results were recorded in regard to general condition, the occurrence of infection in the wound, and the size and consistency of the kidneys as ascertained by bilateral external palpation. The latter procedure we found to be very satisfactory, because our estimations of the size and consistency of the kidneys before death were found to check closely with the actual findings at subsequent necropsies.

Results of Experiments.—From the fifty-one cats used in this work, thirty-eight furnished data which could be utilized. The specimens were fixed in 5 per cent formalin and preserved in sodium benzoate solution of not less than 1 per cent strength. For the sake of description the specimens have been placed in four groups. *Group I* consists of eleven pairs of kidneys in which the duration of ureteral occlusion was from twenty hours to twenty-eight days and in which dilatation of the decapsulated kidney has occurred. In addition, information was obtained by palpation from four other animals which were later lost. *Group II* includes four specimens in which the period of ureteral obstruction was from thirty-two to seventy days and in which renal dilation was present. Also results were tabulated by palpation forty-one days after the operation from another cat which was afterwards lost. This group was not described along with *Group I* for the reason that the periods of ureteral obstruction were such that one might have expected renal atrophy (judging from the results of our atrophy series, *Group IV*). In *Group I* not sufficient time had elapsed for expectation of general shrinkage of the decapsulated kidney. Ten kidneys of unchanged sizes make up *Group III*. *Group IV* is composed of our atrophy series, which includes eight specimens.

The microscopic changes in the kidney after occlusion of the ureter have been worked out in great detail by other experimenters. For this reason we have investigated the gross pathology almost exclusively. Moreover, one outstanding object in this work is the discovery of the ultimate fate of the kidney as a whole after destruction of collateral capsular circulation and concomitant ureteral obstruction, especially whether the organ becomes a menace to the animal or whether it assumes a harmless state.

Group I.—(See *Table 1* and *Figs. 1-4.*) This group includes eleven specimens, one each of 20 hours, 40 hours, 4 days, 7 days, 8 days, 15 days, 20 days, 26 days, 28 days, and two of 10 days of ureteral obstruction. In four other cats which were lost without autopsy, dilatation of the kidney on the obstructed side at 4 days, 5 days, 10 days and 18 days, respectively, was ascertained by palpation.

Six pyonephroses of markedly cystic nature were found in this group. In the other cases the almost exclusive finding was slight to moderate hydronephrosis and hydroureter. In every case the kidney on the obstructed side was somewhat enlarged. One hundred per cent increase in size was the maximum. Perirenal adhesions were present in each instance. In the earlier stages there was hyperemia and of the organ, presumably due to the pressure of the stagnant urine in the ligated ureter and pelvis of the kidney on the veins of the pelvis. The hollowing out process had not begun in the 20-hour specimen, but the beginning of cyst formation were plainly visible in the 40-hour, 4-day, 7-day and 8-day kidneys. Both of the 10-day specimens (*Fig. 1*) and the 15-day one (*Fig. 2*) are markedly cystic. Pus was found in each of these three kidneys.

The 20-day kidney (*Fig. 3*) exhibited dilation of about 50 per cent. The organ was moderately adherent to the adjacent tissues and was very tense. The ureter was markedly distended above the ligature. Upon gross section, there was found in the medulla a cystic cavity filled with a milky fluid and measuring 1.9 by 1.25 cm. The cortices of both kidneys were equal in thickness, but the medulla of the decapsulated kidney was 0.6 cm. thinner than that of the control organ.

The necropsy on cat No. 5 at twenty-six days revealed a slightly hydronephrotic kidney firmly adherent to the body wall and surrounded by cicatricial tissue. The ureter above the ligature was slightly distended with a clear, straw-colored fluid. The cortices of both kidneys were of the same thickness, but the medulla of the decapsulated organ was 0.4 cm. thinner than that of its fellow. In this case ureteral occlusion was incomplete, as the lumen had been restored around the ligatures.

In the 28-day specimen (*Fig. 4*) the decapsulated kidney was dilated to a very small degree and was very adherent to the surrounding tissues. Section of the organ revealed a thick-walled cyst filled with a clear, straw-colored fluid. The pelvis and the ureter above the ligature were dilated and the "calyces appeared as sickle-shaped connective tissue septa extending from the cortex to the pelvis and separating the pyramids from each other" (Scott). The cortices were of the same thickness, while the medulla of the control organ was 0.3 cm. thicker than that of the kidney on the obstructed side.

The location of the ligature in each cat was either close to the pelvis or midway between the bladder and pelvis. In this group the level of the ligature makes no discoverable difference in the results. The animals of this group were fully mature cats except in four cases where two-months-old animals were used. Two of the eight pyonephroses were obtained from the young cats.

The causes of the deaths in this group are as follows: three (19 hr., 4 da., 28 da.) were killed. The 26-day cat was in a state of advanced pregnancy at the time of operation. The 20-day one died from intussusception with inflammation of the ileum. The 8-day animal died from acute dilatation of the stomach. One of the 10-day and 15-day cats probably died from intrarenal infection. These cats were only two months old. Three animals died from causes not ascertained.

Fig. 1 Fig. 2 Fig. 3 Fig. 4

Fig. 1 (Group 1).—Kidneys (interiors of), ureters and bladder ten days after ligation of the right ureter and decapsulation of the kidney of the corresponding side. Lig., location of ligature. Bl., bladder. Note the thick-walled cyst on the obstructed side. Thick yellow pus filled the kidney. Observe also the marked dilatation of the ligatured ureter.

Fig. 2 (Group 1).—Kidneys and bladder fifteen days after ligation of the right ureter and decapsulation of the right kidney. Kidneys incised to show interiors. Lig., location of ligature. Bl., bladder. Note the cystic dilatation in the kidney on the obstructed side. The cyst was filled with thin yellow pus. The ureter above the ligature was moderately dilated. Compare the ten-day specimen (Fig. 1).

Fig. 3 (Group 1).—Kidneys, one ureter, and bladder twenty days after ligation of the left ureter at the renal pelvis and decapsulation of the corresponding kidney. Kidneys incised longitudinally. Note the cystic dilatation of the organ on the obstructed side. This kidney was filled with milky fluid.

Fig. 4 (Group 1).—Photograph of kidneys, ureters, and bladder from a cat, twenty-eight days after ligation of the ureter on the left and decapsulation of the kidney of the same side. Kidneys incised. Bl., bladder. Note the enlargement of the renal sinus and the increase in size of the kidney on the obstructed side. The ureter above the ligature was moderately dilated.

TABLE I.—HYDRONEPHROSIS SERIES (GROUPS I & II)

Cat No.	Age of Specimen	Position of Ligature	HYDRONEPHROSIS		Renal Contents	Infection	Perirenal Adhesions	Ureteral Dilatation Above Lig.	General Condition of Animals	Route
			Compared With Other Kidney	General Character						
47	20 Hours	Close to kidney	Very slight increase in size	Not cystic; almost normal	Small amount of a clear straw-colored fluid	0	Slight	Moderate	Poor, nearly all of the time	Trans-peritoneal
46	40 Hours	Midway between bladder and kidney	13 per cent larger	Hollowing out beginning	Clear straw-colored fluid	0	Slight	Marked	Poor, nearly all of the time	Extra-peritoneal
45	4 days	Close to kidney	Very slightly larger	Hollowing out beginning	Clear colorless fluid	0	Marked	Marked	Good, most of time. Very poor at time of sacrifice	Trans-peritoneal
23	4 days (time of last palpation)	Close to kidney	1.5 x larger (estimated by palpation)	Feels softer than control by palpation	No autopsy	?	?	?	Good	Extra-peritoneal
21	5 days (time of last palpation)	Close to kidney	1.5 x larger (estimated by palpation)	Soft	No autopsy	?	?	?	Good	Trans-peritoneal
33	7 days	Close to kidney	Very slight	Cystic	Abundant yellow pus	+	Slight	Slight	Poor. Probably died from intra-renal infection	Trans-peritoneal
41	8 days	Close to kidney	1.1 x larger	Thick-walled cyst	Yellow pus	+ Bad	Marked	Marked	Fair	Trans-peritoneal
20	10 days (time of last palpation)	Close to kidney	2.0 x larger (estimation)	Softer than control	No autopsy	?	?	?	Fair	Trans-peritoneal
50	10 days	Midway between kidney and bladder	2.0 x larger	Thick-walled cyst	Thick yellow pus; cocci; leukocytes, erythrocytes; a few epithelial cells; and granular debris	+	Marked	Marked	Good at first; later weak and poor	Extra-peritoneal
51	10 days	Midway between kidney and bladder	1.3 x larger	Thin-walled cyst	Thick yellow pus; cocci; erythrocytes; leukocytes; and epithelial cells.	+	Marked	Marked	Fair	Extra-peritoneal

48	15 days	Close to kidney	1.3 x larger	Thin-walled Cyst	Thin yellow pus; cocci; erythrocytes; leukocytes; and epithelial cells	+	Present	Present	Poor; loss of weight; anorexia at time of death	Extra-peritoneal
12	18 days (time of last palpation)	Close to kidney	2.0 x larger (estimation)	Soft	No autopsy	?	?	?	Good	Extra-peritoneal
13	20 days	Close to bladder	1.5 x larger	Thick-walled cyst	Moderate amount of a milky fluid	+	Marked	Marked	Good	Extra-peritoneal
5	26 days	Midway between bladder and kidney	Slightly larger	Hollowing out started	Scant amount of a clear straw-colored fluid	None	Marked	Moderate	Poor	Extra-peritoneal
7	28 days	Midway between bladder and kidney	Slightly larger	Thick-walled cyst	Clear amber-colored fluid	None	Marked	Moderate	Good	Extra-peritoneal
40	32 days	Close to kidney	Slightly larger	Thick-walled cyst	Moderate amount of a yellow pus	+	Marked	Present	Good at first; poor at time of death	Trans-peritoneal
22	41 days (time of last palpation)	Close to kidney	2.0 x larger (estimation)	Soft	No autopsy	?	?	?	Poor	Trans-peritoneal
6	46 days	Midway between bladder and kidney	Slightly larger	Little change	Fluid lost without examination	0?	Marked	Moderate	Good	Extra-peritoneal
17	52 days	Close to kidney	1.5 x larger	Thin-walled cyst	Large amount of greenish yellow pus	+	Marked	Enormous	Poor	Trans-peritoneal
15	70 days	Midway between kidney and bladder	Slightly larger	Thick-walled cyst	Scant and clear	0	Marked	Moderate	Excellent	Extra-peritoneal
Summary 20 Specimens	Average Age, 20 days	12, High 1, Low 7, Midway	8, Slightly larger 12, Averaged 1.57 x larger	9, Thick-walled 4, Thin-walled 2, No cyst formation 5, Soft to touch at palpation	8, Pus 6, Clear fluid 6, No data	8, + 7, — 5, ?	11, Marked 4, Slight 5, ?	5, Moderate 1, Enormous 3, Slight 6, Marked 5, ?	10, Good 3, Fair 7, Poor	11, Extra-peritoneal 9, Trans-peritoneal

Group II.—(See *Table 1* and *Figs. 5* and *6.*) Four pairs of kidneys, 32-day, 46-day, 52-day and 70-day, must be considered here. In addition, the kidney on the obstructed side in another animal which was lost exhibited by palpation marked dilatation at forty-one days. As was stated previously, this group is made up of kidneys which show enlargement, although they are of an age at which one might have expected renal atrophy to have developed. (Reference to the atrophy group will show a specimen 30 per cent smaller than normal at the end of thirty days of complete ureteral occlusion.)

The 46-day kidney was enlarged to a small degree only and there was no evidence of intrarenal infection. Cyst formation, most likely due to back pressure of the urine on the medulla, was just beginning. Very similar to this specimen is the 70-day one (*Fig. 6*), in which adhesions were strong and the ureter above the ligature was only slightly dilated. Upon gross section of this kidney, a firm, almost normal appearing cortex and medulla were seen. Hollowing out had not yet started. The renal contents consisted of a small amount of a clear fluid. In this organ as well as in the 46-day one the pathological changes were so small that one could imagine secondary atrophy to be entirely possible.

In sharp contrast to the two specimens just described are the pyonephrotic 52-day (*Fig. 5*) and the 32-day organs. Here the kidneys have been converted into balloon-shaped sacs filled with pus. This extended down to the ligature on the ureter.

The pelvis and ureter above the ligature in the 52-day case were enormously dilated and the kidney was full and tense. Two angry areas of inflammation were present on the cortex and the cortical vessels were engorged. The renal medulla was entirely absent. The ravages of infection are so marked that one could scarcely conceive of the possibility of secondary atrophy and shrinkage. Perirenal adhesions were strong in all members of this group and cicatricial tissue surrounded the cortices. In this small group no conclusion can be given as to the effect of the level of the ligature upon the outcome of the kidney. The animals used were fully mature cats in good condition at the time of operation. The only animal to die as a result of infection which might have been introduced via the operation was one of the two with pyonephroses.

The six pyonephroses from *Group I* and the two in this group illustrate the fact that intrarenal infection along with ureteral ligation causes greater sacculation in kidneys than ligation without infection. The balloon-shaped sacs of pus are much larger than any of our non-infected hydronephrotic kidneys. One can readily understand this if he considers that to the factors which tend to thin the medulla, already present in non-infected kidneys with ligated ureters, there has been added a tissue destroying factor, bacteria. Concerning the possible sources of these micro-organisms, at least three might be mentioned. The infection might be hematogenous in origin or may have been introduced through the wound. Jacobelli[11] suggests that the urinary current is the best protection against intrarenal infection and Orth[12] holds that bacteria may travel up the ureter by means of motility or growth. Thus when a ligature is applied to the ureter, it is conceivable that an intrarenal infection might take place from bacteria traveling up from the bladder and ureter.

Group III.—(See *Table 2 and Figs. 7-9*). In this are included data from two animals obtained by bilateral external palpation at the end of 52 and 64 days and the following eight pairs of kidneys: one each of 100 days (*Fig. 9*), 71 days, 58 days (*Fig. 8*), 12 days, 7 days, and 6 days, and two of 45 days (one is shown in *Fig. 7*) of ureteral occlusion. The outstanding fact discovered in this group is the failure of the decapsulated kidney to increase in size after ligature of its ureter.

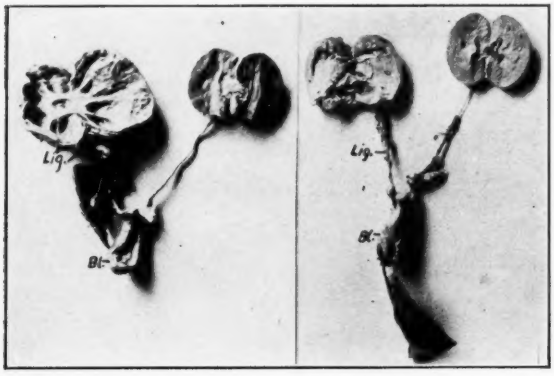

Fig. 5 Fig. 6

Fig. 5 (Group 2).—Kidneys, ureters, and bladder fifty-two days after ligation of the left ureter at the renal pelvis and decapsulation of the left kidney. Bl., bladder. Lig., location of the ligature. Note the extreme dilatation of the left kidney which was filled with thick greenish yellow pus. This is the most marked case of sacculation that developed in the entire series.

Fig. 6 (Group 2).—Photograph of kidneys, ureters, and bladder seventy days after ligation of the left ureter and decapsulation of the kidney of the same side. Lig., location of ligature. Bl., bladder. Note the cystic condition of the kidney and the distension of the ureter above the ligature. Observe also that the size of the kidney on the obstructed side is greater than that of the control organ.

The 6- and 7-day specimens showed no marked pathological changes, probably due to the short period of the obstruction. One cannot say whether hydronephrosis with enlargement or primary renal atrophy would have developed in these kidneys if they had been kept longer. Perirenal adhesions were already marked in the 7-day kidney and absent in the 6-day specimen. The period of the ureteral obstruction does not in every case determine the degree of dilatation or renal atrophy in a kidney. The interiors of the 100-day (*Fig. 9*) and two 45-day specimens (*Fig. 7*) resemble very closely the interiors of the 6- and 7-day kidneys. The older specimens differ, however, from the young ones in that the former are firm and fibrous, while the latter are soft and edematous. No evidence of intrarenal infection was found in any of the five kidneys just mentioned. The 58-day, 71-day and 12-day organs illustrate cyst formation. The first two of these three were filled with pus, while in the 58-day kidney no infection was present.

TABLE II.—NON-ENLARGED SERIES (GROUP III)

Cat No.	Age of Specimen	Position of Ligature	General Character of Kidney	Renal Contents	Infection	Perirenal Adhesions	Ureteral Dilatation Above Lig.	General Condition of Animals	Route
27	6 days	Midway between kidney and bladder	Not cystic; slight hydronephrosis	Small amount of clear straw colored fluid	0	None	Slight	Good	Trans-peritoneal
34	7 days	Close to kidney	Not cystic; slight hydronephrosis	Fluid lost without examination	0?	Marked	Moderate	Good	Trans-peritoneal
49	12 days	Close to kidney	Thick-walled cyst	Pus containing cocci; erythrocytes; leukocytes; a few badly mutilated epithelial cells; and granular debris	+	Present	Enormous	Good at time of operation; poor later. Died from intrarenal infection	Trans-peritoneal
42	45 days	Close to kidney	Slight hydronephrosis; but no distinct cavity formation	Nothing	0	Present	Slight	Good	Trans-peritoneal
24	45 days	Close to kidney	The only pathological change is a slight hydronephrosis	No data	?	Present	Moderate	Good	Trans-peritoneal
16	52 days	Close to kidney	Data obtained by palpation alone	?	?	?	?	Good	Trans-peritoneal
26	58 days	Close to kidney	Slight hydronephrosis; size unchanged	Nothing	0	Marked	Slight	Good	Trans-peritoneal
11	64 days	Midway between kidney and bladder	Data obtained from palpation alone	No autopsy	?	?	?	Excellent	Extra-peritoneal
14	71 days	Midway between kidney and bladder	Thick-walled cyst	Thick brown pus	+	None	Slight	Poor after operation	Extra-peritoneal
8	100 days	Midway between kidney and bladder	Firm; not cystic; no pathological changes save a darker color than normal	Nothing	0	Slight	Slight	Good	Extra-peritoneal
Summary 8 pairs of kidneys. 2, data from palpation	Average 46 days	4, midway 6, high None, low	7, hydronephrosis 1, no hydronephrosis 2, no data	3, nothing 4, no data 2, pus 1, clear non-purulent fluid	2, + 5, — 3, 0	2, None 2, Marked 4, Slight 2, No data	4, Slight 3, Moderate 1, Enormous 2, No data	8, Good 2, Poor	3, Extra-peritoneal 7, Trans-peritoneal

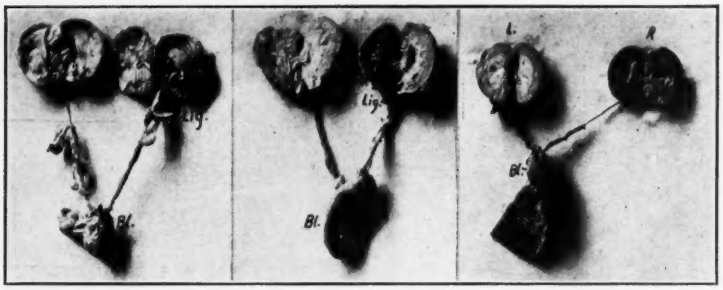

Fig. 7 Fig. 8 Fig. 9

Fig. 7 (Group 3).—Kidneys, ureters, and bladder from a cat forty-five days after ligation of the right ureter and decapsulation of the right kidney. Lig., location of ligature. Bl., bladder. The ureter on the left has been broken by handling. Note that the kidneys are of approximately equal sizes or the right kidney very slightly smaller than the control organ. Observe also the dilatation of the right ureter.

Fig. 8 (Group 3).—Kidneys, ureters, and bladder fifty-eight days after ligation of the ureter on the right and decapsulation of the kidney on the same side. Bl., bladder. Lig., position of ligature. Note that the sizes are approximately the same. Observe also the dark color of the decapsulated kidney and the ureteral dilatation above the ligature.

Fig. 9 (Group 3).—Photograph of kidneys, ureters, and bladder one hundred days after ligation of the right ureter and decapsulation of the kidney of the same side. Bl., bladder. Note that the kidneys are of the same size. Observe the dark color of the decapsulated organ and also the absence of ureteral dilatation. Atrophy would have probably taken place in this kidney had the cat been kept longer.

Concerning the changes around and on the periphery of the kidneys of this group, in the 6-day and 71-day instances there were no perirenal adhesions. The organs were lying loose. The remnants of the renal capsule folded back to the hilum were easily recognized in these cases. In the 12-day, two 45-day and 100-day specimens there were practically no perirenal adhesions. The tissue surrounding the cortices was soft and scar tissue was practically absent. Adhesions were marked in the 7-day and 58-day cases. In particular, cicatricial tissue surrounded the 58-day kidney. On the cortex of the organ itself a covering of tough tissue was present. In most cases in our work, decapsulation did favor the development of adhesions, but they are of a cicatricial nature and not vascular. Anastomosis between the cortical vessels and the vessels of the tissue immediately surrounding the cortex did not take place to any extent. One could separate the kidney from the adjacent tissue by force and find a fairly smooth cortical surface remaining.

In regard to the level of the ligature in this group, four were placed midway between the kidney and the bladder and six close to the kidney. Since none of the kidneys increased in size, we cannot say that high ligation tends to produce the most marked dilations. Three of the operations were done via the extraperitoneal route and seven transperitoneally. The animals of this group were fully mature cats in good condition at the time of operation. Three of the ten animals died from causes produced as the result of the operation. The 6-day cat died from peritonitis and prolapse of the intestines through the abdominal wound. There was enough intrarenal infection to account for the deaths of the 12-day and 71-day cats.

Group IV.—(See Table 3 and *Figs. 10-16.*) This is

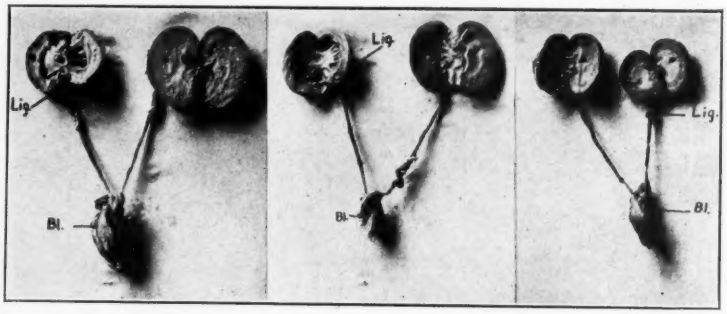

Fig. 10 Fig. 11 Fig. 12

Fig. 10 (Group 4).—Kidneys, ureters and bladder thirty days after ligation of the left ureter and decapsulation of the kidney of the same side. Kidneys incised to show the internal structure. Lig., position of ligature. Bl., bladder. Note the general atrophy and cyst formation in the kidney on the obstructed side. Observe also the moderate dilatation of the ureter above the ligature. The atrophied kidney displaced 10 c. c. of water while the normal control displaced 15 c. c. This was the earliest case of renal atrophy in the series.

Fig. 11 (Group 4).—Kidneys, ureters, and bladder forty-nine days after ligation of the left ureter and decapsulation of the corresponding kidney. Kidneys incised to show internal structure. Lig., location of ligature. Bl., bladder. Note the general atrophy and cystic condition of the decapsulated kidney. The pelvis is slightly distended, although the photograph does not show it. The atrophied kidney displaced 6 c. c. of water while the normal control displaced 10 c. c.

Fig. 12 (Group 4).—Kidneys, ureters, and bladder fifty-one days after ligation of the right ureter and decapsulation of the kidney of the same side. Internal view of kidneys. Note the general atrophy and absence of cyst formation in the decapsulated kidney. The ureter was not dilated above the ligature. The control organ displaced 8 c. c. of water while the atrophied kidney displaced 6 c. c. This is probably a case of primary renal atrophy.

TABLE III.—ATROPHY SERIES (GROUP IV)

Cat No.	Age of Specimen	Position of Ligature	Atrophy Compared With Other Kidney	Hydronephrosis	Renal Contents	Infection	Perirenal Adhesions	Ureteral Dilatation Above Lig.	General Condition of Animals	Route
28	30 days	Close to kidney	1/3	Marked: 1 vol. / 2 unopened kidney = hydronephrotic space	Scant amount of a clear straw-colored fluid	0	Marked	Moderate	Fair	Trans-peritoneal
19	49 days	Close to kidney	1/3	Marked: 1 vol. / 2 unopened kidney = hydronephrotic space	Small amount of a clear straw-colored fluid	0	Marked	Slight	Poor	Trans-peritoneal
18	51 days	Close to kidney	1/3	None	Nothing	0	Marked	None or very slight	Poor	Trans-peritoneal
25	59 days	Close to kidney	1/3	Moderate	Small amount of a clear fluid	0	Marked	Moderate	Good	Trans peritoneal
10	79 days	Midway between kidney and bladder	1/4	Marked: 2 vol. / 3 unopened kidney = hydronephrotic space	Nothing	+?	Marked	Moderate	Poor during first week; later good	Extra-peritoneal
4	107 days	Midway between kidney and bladder	1/3	Marked; very cystic	Moderate amount of a viscid yellow pus	+	Marked	Moderate	Excellent most of the time	Extra-peritoneal
3	114 days	Midway between kidney and bladder	1/2	None	Nothing	+	Marked	Moderate	Excellent	Extra-peritoneal
1	16 months	Midway between kidney and bladder	Very much smaller (estimated by palpation)	?	?	?	?	?	Very good	Trans-peritoneal
Summary	Average 122 days	4, High 4, Midway None, Low	1, 1/2 5, 1/3 1, 1/4 1, Very much smaller	4, Marked 2, None 1, Moderate 1, No data	1, Pus 3, Nothing 3, Nonpurulent fluid	2, + 5, — 1, ?	6, Marked 1, ?	3, Slight 4, Moderate 1, ?	5, Good 1, Fair 2, Poor	3, Extra-peritoneal 5, Trans-peritoneal

the most significant series of all our experiments. Eight specimens of ages ranging from 30 days to 16 months are to be considered in this connection. Thirty-day, *Fig. 10;* 49-day, *Fig. 11;* 59-day; 51-day, *Fig. 12;* 114-day, *Figs. 15* and *16;* 79-day, *Fig. 13;* and 107-day, *Fig. 14.*) In each case renal atrophy, either primary or secondary, has occurred with the result that the size of the kidney has been diminished to 30 to 50 per cent of the size of the organ at the time of operation.

The 30-day (*Fig. 10*) and 49-day (*Fig. 11*) specimens may be taken up together, because they are strikingly similar in appearance. Both kidneys exhibit thick-walled cystic atrophy. There has been almost unanimous opinion among investigators that general renal atrophy almost never occurs during the first few weeks after simple complete ureteral occlusion. Beer[13] and Rautenberg[14] are the only investigators who find general atrophy earlier than the end of the second month. The 30-day specimen was 0.6 cm. shorter and 0.3 cm. thinner than it was at the time of operation. Approximately 30 per cent shrinkage had occurred. The 49-day kidney was 0.4 cm. shorter and 1.3 cm. less in depth than the normal control organ. About one-third of the original size of the organ remained. The dimensions of the renal sinus in both cases were only slightly larger than those of the sinus of the normal control kidney. The atrophy in both cases followed dilatation; for we had determined by bilateral palpation that the decapsulated kidney was slightly larger than the other during the first and second weeks after the operation. At the hilus, where the remnants of the renal capsule were to be found, marked adhesions and firm cicatricial tissue were observed. The tissue immediately surrounding the cortex was slate-colored and very tough. No evidence of blood vessel enlargement could be made out around the cortex. Perirenal adhesions bound the 30-day kidney to the inferior surface of the liver and to the omentum. Adhesions to the body wall were marked in the 49-day instance.

There was no evidence of renal or ureteral infection in either specimen. The renal content was a slight amount of clear, straw-colored fluid. The ureter was moderately dilated above the ligature in both cases. The obstruction had been made as close as possible to the pelvis of the kidney. The 30-day cat was a fully mature, perhaps old, male. The animal died spontaneously from causes which could not be determined at necropsy. The 40-day cat was an old female. Anorexia with consequent loss of weight was shown by this animal for a short time after the operation. At autopsy inflammation and necrosis of the pyloric portion of the small intestine were found. This probably killed the animal.

The 51- (*Fig. 12*) and 114-day (*Fig. 15*) kidneys are examples of primary renal atrophy without cyst formation. In the former specimen a just palpable dilatation was present up to the seventeenth day after the operation. At the twenty-fifth day the kidneys were the same size. Palpable shrinkage was found after the thirty-second day, although the process of atrophy must have been going on several days before. At necropsy, the decapsulated kidney was shown to be approximately one-third of the size of the control. No palpable dilatation was present in the 114-day kidney after the operation. Atrophy began from the first. An exploratory operation forty-two days after ureteral ligation was done, and the kidney on the ligated side was seen to be distinctly smaller than the other one (*Fig. 16*). At the end of the 114 days this kidney was only one half the size of the control organ. Upon section, the 114-day specimen was found to be a solid structure with sinus almost obliterated by ingrowth of white fibrous tissue. The entire organ on the interior was of tougher consistency than a normal kidney. Extensive fibrosis had occurred. The cortex and medulla were practically indistinguishable in the 114-day case. Marked perirenal adhesions were present both at the hilus and about the cortex in both the 51- and 114-

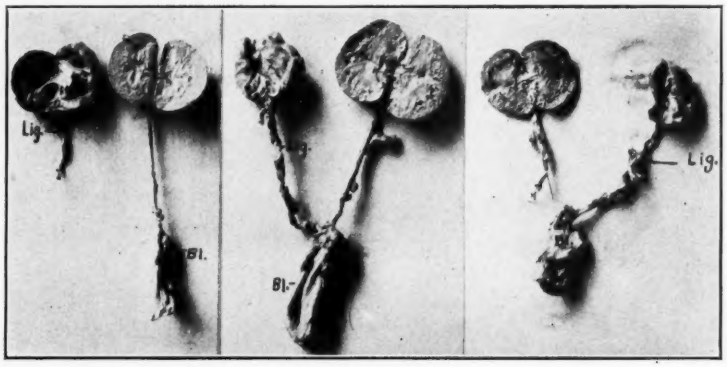

Fig. 13 Fig. 14 Fig. 15

Fig. 13 (Group 4).—Kidneys, ureters, and bladder seventy-nine days after ligation of the left ureter and decapsulation of the kidney of the same side. Internal view. Lig., location of ligature. Bl., bladder. Note the general atrophy and thin-walled cyst in the organ on the obstructed side. The ureter was moderately distended above the ligature. The normal organ displaced 14 c. c. of water and the decapsulated kidney only 9 c. c.

Fig. 14 (Group 4).—Kidneys, ureters, and bladder one hundred and seven days after ligation of the left ureter and decapsulation of the kidney on the same side. Kidneys incised to show the internal structure. Lig., position of ligature. Bl., bladder. Note the general atrophy and cystic condition of the kidney on the obstructed side. Note also that the left ureter is dilated. The normal control organ displaced 18 c. c. of water while the atrophied kidney displaced only 10 c. c.

Fig. 15 (Group 4).—Kidneys, ureters, and bladder one hundred and fourteen days after ligation of the right ureter and decapsulation of the corresponding kidney. Kidneys incised to show the internal structure. Lig., location of ligature. Bl., bladder. Note the general atrophy, absence of cyst formation, and the abnormal shape of the kidney on the ligatured side. Also, observe how slight is the ureteral dilatation above the ligature. The decapsulated kidney displaced 5 c. c. of water while the normal control displaced 10 c. c. This is probably a case of primary renal atrophy.

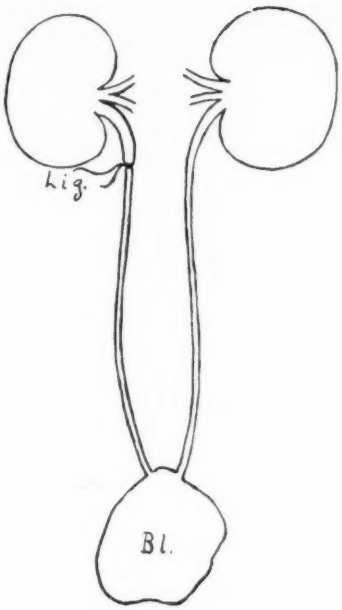

Fig. 16 (Group 4)

Outline drawing of kidneys, ureters, and bladder from a cat, forty-two days after ligation of one ureter and decapsulation of the kidney on the same side. Lig., location of ligature. Bl., bladder. Note that the kidney on the obstructed side is distinctly smaller than the other one. This drawing was made from data obtained during an exploratory operation forty-two days after the primary operation.

day instances. No evidence of renal infection was present in either case. Very slight, if any, ureteral dilatation above the ligature was noted. There was no fluid in the pelvis. The ligature had been placed midway between the kidney and bladder in the 114-day animal and near the pelvis in the other one. The animals were fully grown male cats in good condition at the time of operation. The 51-day animal died spontaneously in a semi-comatose condition. Anorexia, lethargy, and loss of weight were shown by this animal before death. The cause of death could not be ascertained. The 114-day cat died of inanition. Neither of these deaths could be attributed to the effects of the procedure used in the operation.

Thin-walled cystic atrophy was found in the 79- (*Fig. 13*) and 107-day (*Fig. 14*) kidneys. Dilatation up to the twentieth day in the former and up to the twenty-fifth in the latter was detected by palpation. At necropsy, both specimens were found to be at least one-third smaller than the control organs. The remnants of the renal capsule could not be distinguished from the mass of tissue surrounding the blood vessels and ureter. Marked perirenal adhesions existed. There was intrarenal infection in both cases. This was very marked in the 107-day organ. The cyst was filled with viscid yellow pus. The hollowing out had occurred for the most part at the expense of the medulla. The wall of the cyst was tough and thin. The ureter was moderately dilated above the ligature in both cases. The ligature had been placed midway between the bladder and kidney in the 107-day cat and near the renal pelvis in the 79-day animal. The extraperitoneal route of operation was used. The animals were mature female cats in good condition. Both died from renal infection probably.

SUMMARY

In reviewing the data of the four groups, we find that the earliest case of general renal atrophy occurred thirty days after ligation of the ureter and decapsulation of the kidney on the same side. Seventeen pairs of kidneys which are thirty days or over have been obtained. Of these, 47 per cent exhibit general shrinkage and five show no change in size. There is nothing to prove that secondary renal atrophy might not have supervened later in these unchanged specimens. Thus 81 per cent of the kidneys kept over thirty days have shrunk or kept their original size. The remaining 19 per cent are enlarged from just slightly up to twice normal.

Of fourteen pairs of kidneys under thirty days old, eleven are enlarged and three have retained their original sizes. Characteristic of our hydronephrosis series is the fact that there are none of the enormous sacs shown by some investigators after simple ligation. The largest cyst in our series was only twice the size of the control kidney, while kidneys up to thirteen times normal have been obtained after simple ligation of the ureter. Thus it seems that destruction of capsular anastomosis by decapsulation retards the development of hydronephrosis. The duration of ureteral occlusion determines roughly the degree of dilation in hydronephrotic kidneys, but this rule must be applied to a large number of non-infected cases. The level of the ligature does not seem to produce any discoverable difference in the final outcome of the kidney. However, we have not enough of the cases of low ligation to warrant definite conclusions in this connection. The ureter is probably dilated at first in each case due to the thinness of the wall of this duct. Persistence of ureteral dilatation was found in most cases of renal dilatation and cases of cystic atrophy.

Perirenal adhesions were marked in all of the cases of atrophy and in most of the cases of renal enlargement. It was found that the production of adhesions did not mean that vascular anastomosis had taken place. The tissue immediately around the periphery of the kidney was cicatricial in nature and thus practically avascular. Collaterals which may have developed in

the earlier stages were most probably obliterated when fibrous contraction took place. Thus decapsulation seems to be an efficient method of destruction of renal collateral circulation.

In regard to intrarenal infection, we have reported twelve cases out of thirty-eight in which this took place. This means that about 32 per cent of the decapsulated kidneys became infected from micro-organisms gaining entrance through the wound, the blood or from the ureter itself. Our evidence seems to be in favor of the last two sources, because in only four cases of the twelve intrarenal infections was there extrarenal infection. Eleven of the twelve infected kidneys were cystic and nine were also markedly enlarged. In fact, the pyonephroses were the examples of greatest dilation that we have. Of the eight atrophic specimens, two were infected and cystic. The evidence as presented points strongly to the conclusion that intrarenal infection is a factor which tends to prevent renal atrophy and produce sacculation.

CONCLUSIONS

(1) The principal finding in this work is the development of general renal atrophy during the first two months after ligature of the ureter and decapsulation of the corresponding kidney. In four of eight cases of renal atrophy reported, the period of ureteral occlusion was less than sixty days. These observations contrast with the results of simple ligation, which does not usually produce atrophy during the first two months. Thus it seems evident that the added feature of decapsulation hastens very markedly the development of renal atrophy following complete ureteral obstruction. This seems to be due most probably to the destruction of capsular anastomosis.

(2) There is only a small amount of renal enlargement during the first two months after ligation of the ureter and decapsulation of the corresponding kidney. In many instances there was practically none; in others it was slight, and at most it was not more than 100 per cent above normal. These findings contrast with the results of ureteral occlusion alone, which produces nothing but dilatation during the first sixty days, and in large degree.

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CONGENITAL DIVERTICULUM OF THE ESOPHAGUS: CASE REPORT*

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Diverticulum of the esophagus is an uncommon condition, and congenital diverticulum of the esophagus giving rise to a conspicuous deformity at the time of birth, we believe to be exceedingly rare.

Since this anomaly was present at the time of birth and persisted until the time of death of the baby, twenty days later, we shall report the development of the case in chronological order rather than in the usual manner.

E. A. J. R., a colored male infant, was delivered December 24, 1928, by Dr. Lowry Rush, who performed a cesarean section. The mother, aged 45 years, entered Matty Hersee Hospital on the morning of December 24 at full term with hemorrhage from the uterus, originating from a complete placenta previa. She gave a history of eleven previous labors, all of which had been uncomplicated. None of the children had suffered any congenital deformity. The recovery of the mother following abdominal section was uneventful.

The baby at the time of birth was resuscitated with difficulty. When the child first began to cry there immediately appeared a small, soft, fluctuant tumefaction about three-fourths inch above the clavicle in the line of the sterno-mastoid muscle. This swelling was of the size and shape of a small pecan. For the next six days the tumor gradually increased in size until it became the shape of an egg having the dimensions of 7 by 5 cms. By this time the child began

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Fig. 1
Showing the extent of the deformity twelve days after birth.

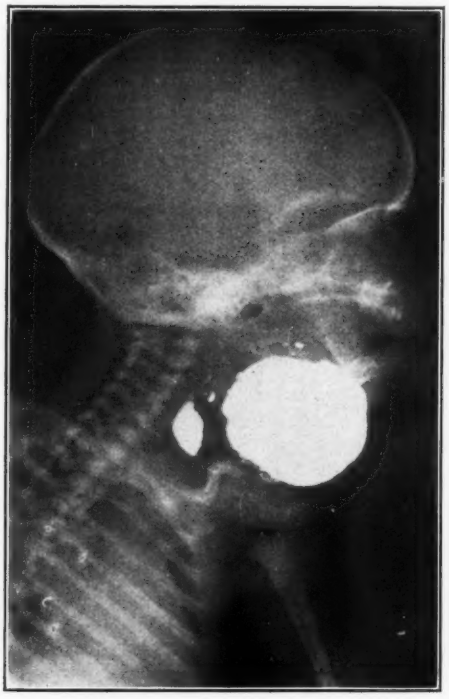

Fig. 2
Radicgraph made on the twelfth day after filling the sac with lipiodol.

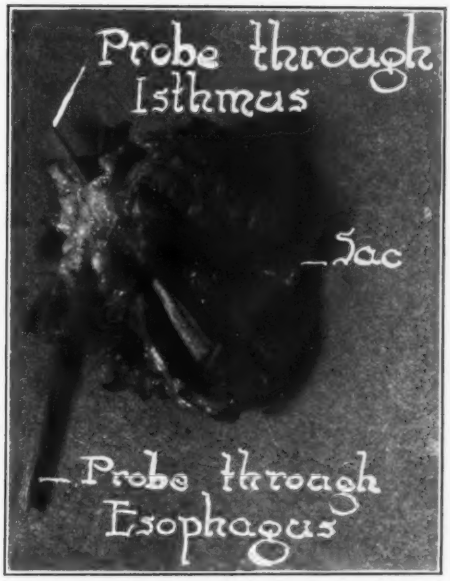

Fig. 3
Specimen removed at autopsy showing the sac with its isthmus communicating with the esophagus.

to show a slight difficulty in breathing and swallowing.

On the ninth day after delivery an aspirating needle was introduced, the sac collapsed by the withdrawal of a large amount of air, and one dram of pus was recovered from the deepest portion of the sac. Both direct smear and culture done on this day from the pus secured showed a mixed infection with the pneumococcus as the predominating organism. Upon the collapse of the sac the infant began crying and immediately the sac again became tightly distended with air, becoming more tense with each expiration during the paroxysm of crying.

On the twelfth day the dyspnea and dysphagia had become more marked, the pulse was rapid and temperature 101° F. The sac had increased to the size of an average orange. Aspiration resulted in the recovery of nearly two ounces of pus with a small amount of air. A radiograph made on this date showed clearly the outline of the trachea with an overlying ring, the size of a nickel coin, which we interpreted as being an outpocketing of the trachea. Eight c. c. of lipiodol were injected, and flat plates made both in the anterior-posterior and lateral directions clearly visualized the sac, but showed no communication with the trachea.

Twenty-four hours later lateral views were made in stereo. The sac showed clearly and could be seen to extend toward the median line, but none of the lipiodol had made its way out of the sac through any channel.

The child appeared very ill and the temperature persisted. On this date physical examination revealed small areas of consolidation at the bases of both lungs posteriorly. Under local analgesia the sac was incised, swabbed with 2 per cent mercurochrome solution, and packed with gauze.

Death occurred on the twentieth day.

Autopsy.—We report here only the essential findings. The neck and thorax were opened. The soft tissues surrounding the sac were infiltrated and were separated with difficulty. These had to be removed *en masse* with the trachea and the esophagus to keep from destroying the isthmus. The thickened sac was freed by minute dissection. A narrow isthmus was found to pass upward and backward from the globular sac to enter the esophagus through an opening in the postero-lateral portion of its wall at the level of the cricoid cartilage. Microscopic examination showed the diverticulum to be inclosed in a suppurative inflammatory process. Both lungs showed diffuse bronchopneumonia.

SUMMARY AND CONCLUSIONS

(1) A case of congenital diverticulum of the esophagus is reported.

(2) Ante-mortem, the sac appeared to communicate with the trachea rather than the esophagus. (a) The globular sac communicated with the esophagus by a narrow, valve-like opening which allowed freely the entrance of air, but rendered its exit difficult. (b) The sac was first filled with air, and became a pus pocket secondarily.

(3) The injection of lipiodol permitted visualization of the contour of the sac, but failed to demonstrate an opening into the esophagus.

(4) Death resulted on the twentieth day from aspiration pneumonia.

ROENTGEN THERAPY OF PERTUSSIS*

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It frequently happens that our attention is brought very forcibly to facts of which we are fully cognizant, but which have remained temporarily in the background of our minds. This is the case with the subject of the short talk which I wish to make upon a topic which I feel none of us can afford to overlook. We have a valuable therapeutic measure which is easily applicable in a large number of distressing cases, the great majority of whom can be given a large measure of relief in this and no other way. It has, however, required the unusual prevalence of pertussis this year to force upon us the realization that there is apparently still need for reminding the profession of this means of therapy. To those to whom the method and its success are familiar, it will probably seem surprising that once more the matter be brought to the front, with very largely the same material, the same uniform amelioration of symptoms, the same technic. But so long as roentgen therapy fails to be the treatment of choice, so long do I feel the matter must be presented again and again to you and through you to the pediatrician.

We must go back as far as 1907 to find our first record of the treatment of pertussis by the roentgen ray. Since this early beginning, its use has slowly increased, but largely it would seem in certain special circles, among the followers of certain men. It has by no means attained the general use which has been accorded the roentgen ray in other fields of therapy. In many instances the pediatrician seems to prefer to experiment with various other means, often not deigning even to give us a trial as a last resort. Perhaps it is because we radiologists are honest in our evaluation of the treatment and make no pretense that we will effect cures in any or all cases, seeming to manifest far less confidence in our agent than the sponsors of the other modes of therapy. Following a long experience with the treatment, I am willing to submit our records for comparison with any other method and I confidently expect the roentgen ray to show more satisfactory results, as judged by the unbiased opinion of the parents, for example.

The attitude of the parent has of late been one of the most striking features of the situation. Time and again it has come to my knowledge that parents are seeking roentgen therapy for their children. And there has never been a time when there has been a more generally expressed dissatisfaction with the other forms of therapy. Without the least encouragement, it is very easy to get the viewpoint of the parent about vaccines, and I must confess that it is by no means flattering to the users thereof.

Before I discuss in particular the matter of actual roentgen therapy, let us first consider briefly the cardinal features of the disease itself. The age incidence is that of infancy and early childhood, and fully 80 per cent of our cases have been among children under the age of ten. Of this 80 per cent, fully half have been infants under three years of age. The remaining cases in our practice have been fairly well scattered as regards age, ranging up to adult life. There would seem to be no natural immunity to pertussis among infants, judging from the number of them coming to us, and again, whatever im-

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*Read in Section on Radiology, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

munity may be conferred by one attack is not permanent, as several of our cases have been treated for a second attack.

The greatest incidence would seem to be in spring and early summer. The fact that our cases seem to be coming to us rather earlier in the course of the disease is to some extent responsible for our somewhat greater success in treatment lately.

The symptoms may be considered briefly, as they are familiar to all of us: the paroxysmal cough, inspiratory difficulty and finally the characteristic whoop, usually with some cyanosis and vomiting. One very important feature, especially in cases where there is any doubt as to the diagnosis, is the definite and constant lymphocytosis. The disease, while often wrongly considered of minor importance, provided no complications ensue, should be given the most careful attention. The unrelieved course of the illness, the violence of the paroxysms, the inability of the little patient to retain his food, the usual aggravation at night of coughing and vomiting, together with attendant loss of sleep on the part of parent and patient, combine to make it one of the most dreaded diseases of childhood. If the parent has not regarded it seriously before, it is certainly not long before he does, once his child begins his real difficulties. Very much like the hay fever patient, he is ready to try almost anything.

After an unrelieved course of pertussis, the child may seem to have successfully avoided all complications, yet we are wrong in feeling that he has safely escaped. The way has been admirably prepared in many instances for later troubles of a pulmonary nature. With all our uncertainty as to the exact pathology of pertussis, it seems definitely established that there is a distinct enlargement of the hilar glands. This can be demonstrated radiographically in the majority of cases and there may very readily be a persistency of this glandular enlargement with its attendant irritating effect. This very glandular enlargement probably explains to a considerable measure the favorable action of roentgen therapy. A further late complication which is equally attributable to the disease is the actual development of bronchiectasis or of the tendency thereto. And from our experience with this troublesome disease we feel that it is worth while to avoid it wherever possible. It is, therefore, not only the immediate complications of pertussis, but also the later ones, which remove it effectively from the category of an infectious disease of childhood of minor importance and place it in a position of major importance, to be actively fought and demanding our serious attention. The roentgen ray can be the greatest single factor in an ultimate victory over it. In a series of 850 cases in Massachusetts, where the roentgen ray was used uniformly, the mortality was 0.3 per cent as against a general mortality for the state of 6.4 per cent for the same year.

The simplicity of roentgen therapy even with comparatively intractable children is one of its greatest advantages, and if the child is able to reason we have as a rule very little difficulty following the first treatment or two. He realizes that he is being benefited and is often as enthusiastic as the parent in regard to the results obtained.

Our method of treatment is to give exposures at intervals of three to seven days, depending upon the severity of the case. Our technic is 140 kilovolts, 5 ma. 20 inches distance, 5 minutes, filter ¼ mm. copper plus 1 mm. aluminum. The average number of required treatments runs between three and four. The exposure is directed to the anterior chest wall as, in our experience, no great advantage has been found in dividing the dose anteriorly and posteriorly.

I realize that there is some variance in the dose advocated here from that used by other workers. We have used various dosage factors and accomplished much the same with all, but prefer very distinctly in all our work the minimal necessary dose. The technic given is the average formula, but to be varied according to the individual case, greater intensity of treatments and greater frequency to be given as the patient requires it. A small cone should be used to confine the rays to the hilar area and attention must be given to protection of the thyroid area, especially in older children. We do not concern ourselves with any attempt to avoid the thymic area, feeling that if there be a coincident thymic enlargement it will be the better for receiving its share of radiation. With the present questioning attitude of the laity, it is more than ever important that we should avoid allowing any impression that we are careless of the

application of radiation in any part where it is not required, even though we ourselves are fully aware of its entire harmlessness.

Before considering what we accomplish in treatment allow me to mention the use of roentgen therapy as a prophylactic measure for children who have been exposed. We have an impression that it is of value, as we have noted the failure of the disease to develop in the children of the same family where the exposed children were treated as well as the patient.

The benefits to be derived from roentgen therapy of pertussis are primarily a very prompt relief of the paroxysms of coughing with the attendant vomiting. This usually occurs shortly after the first exposure and it is the outstanding feature, because with the paroxysmal coughing eliminated, the remaining cough which may still occur is of no great importance. In the majority of cases there is a distinct shortening of the usual long-drawn out course of the disease and the associated complications are, as a rule, absent, owing to the relief of the cough.

In conclusion, I merely wish to urge again that all pertussis patients be given the advantage of roentgen therapy. It can do no possible harm, and I believe that it will do great good.

3503 Prytania Street

DISCUSSION (*Abstract*)

Dr. E. C. Thrash, Atlanta, Ga.—I have used this method extensively myself, more in the delayed cases that were slow to get well. I have obtained especially good results with tracheobronchial adenopathies.

There is little difference between the x-rays and actinic rays of the sun, quartz lamp rays, except in intensity. Is not it probable that in irradiating the pertussis cases we produce an effect upon the whole system? We have as good results from treating over the spleen as we do if we treat directly the infected areas. Probably we are treating over the heart more than over the spleen and producing an effect upon the blood that enables the patient better to combat the disease.

This is a therapeutic agent that should be instituted generally. The results are exceedingly good.

My experience has been limited to cases that did not respond, but kept coughing for weeks or months.

If we prescribe time and a little iodin and cod liver oil with our radiotherapy, we shall cure many cases with fever and tracheobronchial adenopathy that nothing seems to help.

I usually give about 300 milliampere minutes, 160 peak kilovolts, ¼ mm. copper, 1 mm. aluminum filters, and 18-inch distance. This treatment is divided up into three or four dosages (90 to 100 milliampere minutes per treatment) which covers a period of from two to four weeks.

Dr. Floyd D. Rodgers, Columbia, S. C.—My experience with the method of treatment advocated by our Chairman has been rather disastrous. We have just as many pneumonias following it as we did when we gave our patients syrup of quinin. The patients lose as many meals, and I am frank to say that I was very much discouraged in the treatment of pertussis with the x-ray.

In the Floating Hospital in Boston they went into quite a number of details as to the sequelae, that is, pneumonia particularly, and they found there was a variation, that the patients who had had irradiation did just a little better than those who had not.

Our scientific data is still extremely poor. Until we improve it we shall not be able to impress the lay people. To say that we think a method of treatment improves the condition is not enough. We must prove that what we are advocating is more than an empirical treatment, and as yet in the records I have seen nothing except empirical ideas.

I do not treat tonsils any more by radiation and I do not treat pertussis any more by radiation, because I feel that they are both in the same class. Both depend on the shrinking of lymphoid tissue for a cure.

Dr. John D. MacRae, Asheville, N. C.—There are logical reasons why pertussis should be remedied by x-ray therapy. It is a disease which occurs in children, lesions in the lymphoid tissue predominating, and you know there is no tissue more susceptible to radiation than is lymphoid tissue. We have all observed in our radiographic study of children with adenopathies that the adenopathy which follows pertussis is very pronounced, probably more pronounced than in the other diseases to which children are liable. If, by our x-ray treatments, we can produce atrophy of the lymphoid tissue, we should obtain amelioration of symptoms and shortening of the course. The very nature of the disease is such that investigation of it is not so thorough as is necessary to enable us to draw our final conclusions. People hesitate to bring out children with whooping-cough; the pediatricians have not sought to have x-ray treatments to any great extent. Dr. Samuel's paper gives actual results which are not entirely offset by impressions of some other men.

Dr. Samuel (closing).—If I see any other form of therapy that is better I am willing to stop the x-ray treatment of pertussis. These little patients come to my office vomiting practically every feeding and after one exposure of the anterior chest wall the vomiting stops and the patient has practically an entire night's rest. Whether this is empirical or not, we are accomplishing something by the use of the roentgen ray.

Three weeks ago I had the pleasure of being with Dr. Ralph D. Leonard, the one who did the work for the late Dr. Bowditch at the Floating Hospital, and his results have checked with mine. Dr. Leonard will publish a paper in the near future showing that his results have been a little better than mine at present.

Physicians are as enthusiastic about the treatment in Boston today as when they started out about ten years ago.

TREATMENT OF CHRONIC MAXILLARY SINUS SUPPURATION*

By R. M. ARMSTRONG, M.D.,
Lexington, Ky.

Assuming our familiarity with the etiology, diagnosis and symptoms of this condition, I shall mention only the points I desire to emphasize and possible complications which may arise during the course and treatment of this condition.

Usually there is no pain over a chronic suppurating maxillary sinus, but there is a rather constant pain over or through the eye or temporal region. Many have vague feelings through the face or a sensation of tightness over the antrum or localized tri-facial neuralgia may be present. If the secretion of pus is so small that it only overflows occasionally into the nasal chambers the objective symptoms may be slight, although the patient complains of odor or bad taste. The subjective fetor is an important point in the differential diagnosis between this and atrophic rhinitis. In the latter condition the fetor is objective.

When the ostium is obstructed and when an acute exacerbation is grafted on the chronic condition, attention is often times directed to the affected sinus by redness, swelling and tenderness of the cheek and lower eyelid on the affected side. The nostril on the affected side will generally reveal pus in the middle meatus, and in the posterior choanae it is seen lying below the end of the middle turbinate. Sometimes it is found in the region of the olfactory cleft or may have accumulated on the floor of the nose. To determine the exact source, the nose should be carefully cleansed. Perhaps the best method and one I have used as a routine is a post-nasal douche of some hypnotic solution. After waiting a few minutes a re-examination will reveal pus under the middle turbinate if the origin of the pus is the maxillary sinus. From the involvement of the mucous membrane there may be a subacute conjunctivitis or through the circulation a uveitis or systemic infection of some distant organ. Another class of patients is inconvenienced from what seems to be frequent colds, while others suffer from headaches, neuralgia, fatigue without apparent cause or a constant discomfort in the head. A third group are invalids from blood stream infection.

After the disease exists months or perhaps years the muco-periosteal lining undergoes degenerative pyogenic changes and function is destroyed. Some writers suggest that intranasal surgery alone is all that is needed to cure a chronic maxillary sinus suppuration by thorough ventilation and drainage. This has not proven true in my hands.

The method of treatment I have found most satisfactory is irrigation of the sinus three times weekly, for a period of six weeks, with one pint of warm water to which has been added forty minims of tincture of iodin, before doing a radical operation. I also hyperalkalinize the patient thoroughly, giving daily a combination of small doses of bicarbonate of soda, salicylate of soda and milk sugar.

In the local treatment a small cotton wrapped applicator is dipped in the solution for local anesthesia, which is inserted under the anterior tip of the inferior turbinate and pushed back slowly to a point just behind the apex of the curve until the processus maxillaris is reached. The uppermost point between the turbinate and the lateral wall is the logical point for antral puncture. Three or four applications to this region are made before attempting to enter the antrum with the trocar. The bony wall at this point is very thin and steady; firm pressure is all that is required to insert the trocar into the antrum, directing the point of the trocar towards the outer canthus in order to avoid the orbit.

I spray the nose with some bland oil to prevent irritation from the iodin solution used in irrigating the antrum.

After inserting the trocar into the antrum have the patient lean well forward and close the eyes in order to prevent a profuse lacrimation and possibly conjunctivitis, either of which will be very annoying to the patient and embarrassing to the surgeon.

The radical operation of choice is the Caldwell-Luc, which is familiar to all oto-laryngologists. It may be done under local anesthesia, but I prefer gas-ether anesthesia in most instances.

In doing a Caldwell-Luc operation under a general anesthetic it has been my rule to inject about 40 minims of 1 per cent solution of novocain to which has been added three or four minims of adrenalin hydrochlorid (1-1000) deep in the line of incision over the canine fossa, which apparently lessens the amount of bleeding. Do not extend the line of incision further

*Read in Section on Eye, Ear, Nose and Throat, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

forward than the second bicuspid tooth. By doing this you avoid the anterior dental nerve supply and the numbness in gums and lip which is so disagreeable.

The opening in the canine fossa should be large enough for a careful inspection of the interior of the maxillary sinus, avoiding injury to the infra-orbital nerve and roots of the teeth below. On inspection, the muco-periosteal lining may present a smooth appearance, or be covered with minute abscesses. A polypoid mass may practically fill the cavity, or pus may fill the cavity of the antrum. The entire mucosa is undergoing degenerative changes, is very thin and shows chronic infection throughout.

Pus is sometimes found between the muco-periosteum and the bony wall or an osteitis may be present, particularly in the floor of the antrum if the infection is of dental origin. Walls of blood vessels entering the bone may become thickened, and occasionally the entire cavity is filled with mucus cysts. Most cysts contain clear serum, occasionally muco-purulent or tinged with blood. Polypi may be of mucoid type, contain fibrous tissue or become calcified.

In some cases only a smooth lining membrane is found which may be misleading. On careful inspection it will be found slightly pink in color and on elevation it is found to be lying loose in the cavity of the antrum. On examination chronic inflammation will be found present.

Any lining membrane that remains in the antrum may be a source of infection and great danger to the patient. The success of the operation depends on the thoroughness of removing every vestige of membrane from the antrum and on making a large naso-antral opening to allow sufficient drainage and ventilation.

There are different methods of removing muco-periosteum. Perhaps two are worth considering. Curetting of the antrum can be done in all cases. Elevating the membrane by beginning dissection around the opening in the canine fossa can be successfully done in some cases. The condition in the antrum will usually suggest the proper surgical procedure.

The naso-antral opening should be made through the opening in the antral wall (canine fossa), carefully taking down wall to floor and backward as far as the processus maxillaris if the surgeon deems it necessary. The inferior turbinate should not be removed unless it actually interferes with ventilation and drainage. In most instances infraction can be successfully done.

For antral pack a 1 per cent iodoform gauze saturated in tincture of benzoin solution should be used from the nasal side and allowed to remain twenty-four to forty-eight hours. Upon removing this pack a few drops of 5 per cent solution of mercurochrome should be instilled into the antrum or a cotton tipped applicator should be inserted which has been saturated with this solution.

The patient should be kept in a recumbent position from twenty-four to forty-eight hours. An ice bag or hot water bottle over the antrum may be used to control edema and pain. Rarely is an opiate necessary to relieve pain.

In some cases I have used an ounce of hexylresorcinol full strength twice a week, which appeared to shorten the period of discharge and hasten the recovery after a Caldwell-Luc was done.

I have been using this solution, however, only a short time and ultimate results cannot be told. I mention it here because I feel it is worthy of further trial.

DISCUSSION (*Abstract*)

Dr. J. A. Stucky, Lexington, Ky.—Two things confront us in dealing with a chronic, suppurating sinus. First, in order to preserve the function of the sinus we must have ventilation; second, we must have drainage. When we do not have ventilation and drainage but a cavity containing fluid, we have a well or cistern, not an air chamber. If the epithelium of the mucoperiosteum lining of the sinus is destroyed or so impaired that it does not function, we have pain with or without clinical evidence of sepsis. This is rare, but we do meet it sometimes.

I consider the treatment of chronic sinusitis from three viewpoints: first, pre-operative; second, systemic; and third, operative.

First, ventilate and drain through the middle meatus. Avoid puncture into the antrum with a trocar, if possible through the inferior meatus. Avoid any injury to the inferior turbinate bone, because it is an offshoot of the superior maxillary and not of the ethmoid as is the middle turbinate. If necessary, sacrifice the middle turbinate if you cannot fracture and push it to one side, giving sufficient room to free the hiatus semilunaris. Ventilate and drain through the natural opening if possible.

Second, use a hypotonic solution or alkaline antiseptic solution. Two or three ounces of this washed through the antrum is sufficient. If these solutions do not give decided results in a day or two then I use metaphen (1-5000), which has proven very satisfactory. I am very much encouraged in results from the use of S. T. 37 (hexylresorcinol) in 50 per cent solution for irrigation of the antrum. In an acute exacerbation of a chronic condition, with elevation of temperature, I use as in any acute septic trouble in the eye, ear, nose or throat the hypodermic injection of milk or lactigen 3 to 5 c. c. every other day until a thorough reaction is obtained.

The systemic treatment is important. I begin by hyperalkalinizing the patient. For many years I have used satisfactorily a staple artificial alkaline water (Kalak) in these conditions. I restrict the diet to skim milk (sour milk is better) and citrous fruits or stewed fruits for a few days. These cases all have a calcium deficiency and respond readily to daily doses of vitamins A and B as given in cod liver oil and concentrated brewers' yeast.

As to the operative treatment, the Caldwell-Luc is the operation of choice. I make a large opening in the canine fossa and curette thoroughly but gently. I save as much of the mucoperiosteum as I can, for what this lining is to the inside of the cavity the periosteum is to the outside of the bone. After the operation daily cleanliness and irrigation are used as long as necessary. I employ the post-nasal method almost exclusively, and it is astonishing how little irrigation you have to do through the antrum if the posterior nares are thoroughly cleansed beforehand.

Dr. John J. Shea, Memphis, Tenn.—Sinuses do not become chronic very rapidly, and I wish to make a plea for one thing. Quite often we allow the house men in the hospital to do a radical antrum operation, and they see with what ease it can be done and then they find too many reasons when they go out for doing radical antrum operations. A radical antrum operation is a serious thing to the patient because it destroys the sinus on which it is done and prevents its ever being a physiological factor for that patient.

Why does a sinus become chronic? Today the best conception we can have of our sinuses is not that they give air space for buoyancy, or a sounding board for the voice, but they enter in some way into our immunization against the infections of our environment.

Everybody says the lining membrane of the antrum has no mucous glands in it. Somebody put that in a text book and everybody copied it, but it is wrong. Look at sections of the lining of the sinuses under the microscope, from both the ethmoid and maxillary that you remove, and you will find that at times there may be localized abscesses within the membrane, not gross abscesses, but minute areas of pus and infiltration. It is my belief that the sinuses perhaps enter into our immunization. The individual is possibly inoculated with a certain amount of infection continuously from the sinus so that when he comes in contact with severe infection he does not succumb. It is our previous experience in combating infection that saves us from dying every time we meet a severe one before we can develop an immunity. Every infection in a sinus from childhood on will leave its earmarks on the sinus. In the child the infection leaves its earmarks in the stoppage of development of the sinus. The only thing that will arrest the development of a sinus is infection. I have seen a case where there was no opening whatever into the nose anteriorly, but the sinuses were developed normally. The sinuses do not need aeration, but they must be kept free of infection. To prevent a sinus from becoming chronic is the proper treatment of the acute infection.

When a radical operation is done on the antrum it is just as if we took a radiator that was not working well in one part and filled it half full of cement. The cemented radiator will never give us any more heat. The antrum that has had a radical operation is gone so far as the patient is concerned.

One of the things today that leads to many radical operations is the foolish diagnoses made through the use of lipiodol. You see pictures with lipiodol in which the sinus is not completely filled. It cannot be kept completely filled because there may be several ostia unless the nose is thoroughly packed, but a diagnosis is erroneously made and the operator goes in and thinks he has to destroy the membrane.

One of the best things that lipiodol does is to outline dental cysts. I wish to speak of that with reference to operations made upon the antrum for dental cysts. If the antrum is opened and the dental cyst completely removed, the rest of the antrum may be perfectly healthy, and if it is, it should be left alone, because you cannot duplicate that membrane. In dental cyst cases where you are going to do a radical, when you take out the cyst and go into the antrum there must be a permanent opening from the cyst to the outside world forever, or the cyst will probably re-form. It is like a mucocele. There must be permanent drainage, and the important thing in doing a radical operation where a dental cyst is the cause is to be sure you have a permanent window underneath the inferior turbinate, which must be kept open over a long period of time. But if the rest of the membrane in the antrum is healthy, leave it alone.

Patients who have had a submucous, have had their turbinates and ethmoids operated upon, have had all kinds of intranasal work, and still continue to be chronic sinus cases, in these we often find that the sinus that is involved and the antrum needs a thorough cleansing. Then a radical operation should be done with the hope of completely wiping out that sinus. But the patient who has been operated upon radically for a sinus or an infection of the antrum, every winter thereafter should have artificial aid to help his immunization against the infections of his environment, or he will be subject to other types of respiratory infection.

Dr. John H. Foster, Dallas, Tex.—As Dr. Stucky has said, it is important that our acute cases should not be allowed to become chronic. We are not to be excused for allowing that to happen; but, unfortunately, a large number of patients come to us in whom the process has already become chronic. Careful examination and working up of the case will determine to a large degree the class of case which requires simple intranasal drainage and those that require radical operation. Generally in proportion as the discharge is purely purulent the chances of curing by drainage alone are greater; the more mucoid the discharge, the less chance of curing by drainage alone.

The use of lipiodol injections is important in this class of case. I am sure that Dr. Shea did not intend to infer that it was not. If one will pack carefully the middle meatus with lipiodol a very good outline of the sinuses can be obtained, but if we have a polypoid condition of the membrane, a thickened membrane throughout, it is useless to do an intranasal drainage operation. The condition may be improved and the patient get well so far as pus is concerned, but the first time he gets an infection the whole trouble recurs. So I think that type of case needs a radical operation. If the lipiodol picture shows the membrane thin, the intranasal operation will frequently give a good result.

In many of these cases you will find a localized abscess in the antrum itself.

SOME CAUSES OF OCCASIONAL INFECTIONS IN CLEAN ABDOMINAL CASES*

By C. N. CARRAWAY, M.D.,
Birmingham, Ala.

The problem of producing a sterile operating field and keeping it sterile through an operation is the greatest problem that confronts surgery, notwithstanding our present day knowledge of bacteriology. Our greatest handicap is that we are dealing with things that are microscopic instead of macroscopic.

With the usual methods of sterilization and surgical technic, we can be reasonably sure of sterilization of all materials used in and around an operation, and with well trained assistants and nurses the surgeons have great assurance against contamination due to a break in technic. However, there is another factor that the surgeon and his assistants have to reckon with, and that is the infection in the patient's own body. The skin normally contains within its glands numerous pyogenic bacteria. The alimentary canal also contains numerous pyogenic bacteria. As long as these germs remain in their normal habitat they are perfectly harmless under normal conditions, but if they are allowed to get into the tissues of the body they will produce inflammatory conditions and destruction of the tissues.

There are very few operations in which the skin does not have to be cut through. It has been shown that it is impossible to sterilize the skin perfectly in all of its deep layers in 100 per cent of cases. We have used 7 per cent iodin and have also tried the G.U.M.B. 5 solution recommended by Dr. Kingsley Roberts, of New York, with which he claims to obtain 100 per cent sterilization of the skin surface. We also have been using mercurochrome solution, made up in alcohol and acetone. We have cultured the knife blades that were used for making the skin incision. Out of 562 blades cultured, the mercurochrome solution gave the greatest number of negative cultures, or 80 per cent; iodin gave 75 per cent; and G.U.M.B. solution 66 per cent.

The following is a report from the laboratory of the 562 blades cultured: there were 445 negatives and 117 positives (or 20 per cent plus of positive cultures and 80 per cent of negatives).

Staphylococcus was found 69 times; streptococcus 3 times; Gram-positive bacilli 19 times; Gram-negative bacilli and cocci 14 times; Gram-negative spore forming bacilli and cocci 3 times; and Gram-positive spore forming bacilli and cocci 7 times.

I shall give the technic and preparation that we used in this series of cases, which began in January, 1926. All patients, where possible, were admitted to the hospital the evening before they were to be operated upon. Preparation was begun by scrubbing the field of operation thoroughly with soap and water and shaving it; scrubbing with ether and painting with mercurochrome solution of the following formula:

1050 c. c. distilled water.
300 c. c. acetone.
1650 c. c. 95 per cent alcohol.
60 grams mercurochrome.

In a few cases we used G.U.M.B. solution of the following formula:

Gentian violet, 5 grams.
Methylene blue, 5 grams.
Alcohol 95 per cent, 50 c. c.
Distilled water, 50 c. c.

In a few cases we used 7 per cent iodin. After the surface had dried a sterile towel completely covering the field of operation was applied and held in place with adhesive tape. All the material used in these operations was sterilized under twenty pounds pressure of steam for thirty minutes on three consecutive days before using. All instruments and catgut were boiled twenty minutes in a bicarbonate of soda solution. The surgeons, assistants and nurses all wore caps and masks that covered the mouth and nose thoroughly. Hands and arms were scrubbed for twenty minutes with soap and brush, under running water, rinsing their hands and arms in 1-1000 bichlorid solution, and then in 95 per cent alcohol; drying with sterile towels. They were robed in a sterile gown with a sterile back that makes the wearer as sterile in the back as in front; hands were dusted with sterile powder; gloves were held by the nurse so that no part of the hand touched the exterior of the glove when they were applied.

All instrument tables were covered with two or more thicknesses of sterile cloth; all patients were given a preliminary injection of morphin and atropin thirty minutes before time for the anesthetic to start. Ethylene and oxygen anesthesia were used, as they produce less sweating and give more general satisfaction in our hands than any anesthetic we have used.

After the patient is completely anesthetized

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and put in position the sterile towel that was applied to the abdomen the evening before is removed. The field of operation is re-scrubbed with ether until practically all of the mercurochrome stain is removed from the skin surface. The field of operation is surrounded by sterile towels and repainted with mercurochrome of the same formula that was used before. The patient's body is then covered above and below the field of operation with sterile sheets. What is known as the lap sheet is applied, which covers the entire body of the patient, with an opening to work through.

It is our practice not to touch the skin surface of the patient with our gloved hand while making the incision. After the incision is made the knife blades are detached from the handle and dropped into a culture tube containing a medium of beef infusion broth with 1 per cent dextrose, specially prepared for this work by Dr. George S. Graham.

After the bleeding points in the wound are controlled by ligation, a sterile towel is fastened to the skin edges of the incision with clamps in such a manner that when the towels are folded over the clamps the skin surface of the incision and around the incision is completely covered. The usual care is used in completing the operation, but we still had an occasional contamination in about 10 per cent of our clean cases, which resulted in most instances in a straw-colored fluid which formed beneath the healed skin incision; and occasionally a fluctuation developed at some point in the incision, which, when opened, let out a quantity of offensive pus. On two occasions we had a severe infection.

We began culturing the needle end of all sutures used in suturing the gut, such as purse strings, which constituted about 96 per cent of the cultures in this series of 382 cases. The remaining 4 per cent were where the gut had been freed of adhesions and raw surfaces has been covered and sutured. No sutures were cultured in the series where the lumen of the gut was intentionally penetrated.

The first few cultures made from these sutures were positive, and we began to take the following precaution against the contamination from the sutures used in suturing the gut. We placed a pad of gauze of several thicknesses in the incision on either side of the gut after the part to be sutured had been delivered into the incision. This gauze had thoroughly covered the wall on both sides of the incision and extended well into the abdominal cavity. A piece of rubber dam about twelve inches square was placed in like manner over the gauze, a sterile towel was put lengthwise the patient on either side of the incision, and a third towel put across the lower end of the two lengthwise towels, completely covering the sterile field of operation. The instrument nurse put all material and instruments to be used in this step of the operation, when the gut is to be sutured, on these towels. She then remained out of this part of the operation. The assistant and I completed this step of the operation, being careful that our hands and the instruments used in this stage of the operation did not touch any sterilized part of the patient, except the last three applied towels.

After the completion of this stage of the operation and the tying and cutting of the sutures the needle end of the sutures were held over the mouth of the test tube containing culture medium and the suture clipped in small pieces and allowed to drop into the medium. The part of the gut that was sutured is carefully replaced into the abdominal cavity, care being taken that it does not touch the walls of the incision in replacing.

All instruments, the three towels, rubber dam and the two packs are carefully discarded. The assistant and I rinse our hands by having 1-1000 bichlorid solution poured over them.

We were able by this additional technic in 382 cases to reduce our infections to only two cases, where serum developed in the incision. There has been none with pus.

The following is a report of the cultures from the laboratory:

Total number sutures cultured, 382.
Number positive cultures, 202.
Number negative cultures, 180.
First 118 cultures gave 79 per cent positives.
Second 100 cultures gave 72 per cent positives.
Third 162 cultures gave 52 per cent positives.
Cultures containing staphylococcus, 84.
Cultures containing Gram-negative bacillus, 59.
Cultures containing Gram-positive bacillus, 41.
Cultures containing Gram-negative bacillus and coccus, 2.
Cultures containing Gram-positive bacillus and coccus, 9.
Cultures containing both Gram-positive and positive bacillus, 2.
Cultures containing spore forming bacillus, 2.
Culture containing streptococcus, 1.
Total number positives, 200.

All intestinal sutures used were welded on needles, so the suture would not be double at the eye, and with unusual care not to penetrate

the lumen of the gut we were not able to reduce the positive cultures below 52 per cent from the needle end of the sutures.

DISCUSSION (*Abstract*)

Dr. Frank K. Boland, Atlanta, Ga.—The value of any skin antiseptic depends upon its power of penetration. We found that when tincture of iodin was removed immediately with alcohol, in many cases we grew cultures from the skin. If the iodin was allowed to remain until it dried thoroughly, and was then removed, cultures were negative. It is a mistake to wash iodin off too quickly. Mercurochrome-220 *per se* is not an antiseptic on the unbroken skin, but mixed with acetone and alcohol it is very effective, and we use it almost exclusively at present.

There are three special points to be kept in mind in preventing skin infection: one is careful hemostasis in closing the wound; two, the avoidance of all dead spaces; and, three, the avoidance of too tight ligatures on vessels and other tissues. Vessels should be tied singly and not *en masse*.

CONTROL OF BIOLOGICALS WITH SPECIAL REFERENCE TO THE SCARLET FEVER PRODUCTS*

By R. E. Dyer, M.D.,†
Washington, D. C.

A little more than a quarter of a century ago the Congress of the United States passed a law which is usually referred to as the law for the control of biological products. Officially it is the "Act to regulate the sale of viruses, serums, toxins and analogous products in the District of Columbia, to regulate interstate traffic in said articles, and for other purposes."

Shorn of its legal phraseology, this law provides for the issuance of licenses by the Secretary of the Treasury to those engaged in the manufacture and sale of biological products in the District of Columbia and in interstate traffic. Certain provisions are also made for the labeling of biologicals with reference to the proper name of the product, name and address of the manufacturer, and the date beyond which the contents of the package can not be expected beyond reasonable doubt to yield their specific results. The same provisions of this law that apply to the manufacture and interstate sale of biological products also apply to the manufacture of such products intended for sale in a foreign country, or manufactured in a foreign country for sale in the United States.

In addition to providing for the licensing of manufacturing establishments and for the proper labeling of products, the law for the control of biological products also provides for a board consisting of the Surgeon-Generals of the Army, Navy and Public Health Service. This board, subject to the approval of the Secretary of the Treasury, is given authority to draw up such regulations as may be necessary to govern the issue, suspension and revocation of licenses for the maintenance of establishments for the propagation and preparation of viruses, serums, toxins, antitoxins and analogous products applicable to the prevention and cure of diseases of man which are intended for sale as outlined above. The burden of the enforcement of this Act is placed upon the Secretary of the Treasury and the actual details are looked after by the United States Public Health Service subject to the approval of the Secretary of the Treasury. It may well be mentioned here that the burden of enforcement is not a heavy one, since practically all of the difficulties encountered in enforcement are technical difficulties in no way engendered by the desire of the manufacturer to evade the provisions of the law. In fact, the manufacturer is interested equally with the physician in strict enforcement of the control of biological products. It has insured to him an honest competition which has resulted in the production of biological products in this Country the high quality of which is not equalled in any other country in the world.

To the practising physician and to the patient the control of biological products insures products that are safe, potent, if potency can be determined, and insures that either experimental or clinical evidence is available at least strongly suggestive that the preparation has prophylactic or therapeutic value. The presence of a United States license number on the label of a biological product means that the material is as specified by the proper name appearing on the label and that it has been manufactured by recognized methods in a properly equipped establishment by an efficient and adequately trained personnel, and that certain precautions have been taken to insure the sterility of the product. When, in addition to the license number, a statement of potency appears on the label this statement means that carefully controlled tests have been made by the manufacturer, and in the case of certain products repeated at the

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†Surgeon, United States Public Health Service, Hygienic Laboratory

Hygienic Laboratory of the Public Health Service to determine that potency.

In regard to the details of control I can do no better than quote from an article by Dr. McCoy, Director of the Hygienic Laboratory. This article appears in the text of "The Newer Knowledge of Bacteriology and Immunology," edited by Jordan and Falk.

"Inspection.—Producing laboratories are inspected prior to the issuing of a license in order that the licensing authority may have full information as to the facilities of the plant as regards personnel, methods, and equipment. Inspections are repeated usually annually, in order that there may be no undetected lapses in any respect which might impair the quality of the products. Inspection discloses such defects as failure to keep adequate records of processes, failure to take and keep records of the temperature of horses producing serum, inadequate separation of work on pathogenic spore-bearing organisms from other operations, failure to keep horses under immunization constantly protected against tetanus, and inadequate processes of sterilization.

"If, as the result of inspection, it is discovered that contaminated or impotent products are being produced, or if such defects are disclosed in any other manner, the license of the manufacturer may be suspended or canceled, or certain lots of products may be withdrawn from trade channels.

"Purity.—It is important that extraneous living organisms be excluded during the process of manufacture of most products. This is accomplished by requiring tests for identity and purity of cultures prior to beginning manufacture of a batch of a product. In some cases—e. g., bacterial vaccines—the presence of contaminating organisms may be disclosed by so simple a procedure as the making of smears from finished material. Thus a pertussis vaccine showing gram-positive diplococci evidently has been contaminated at some stage of the process of manufacture.

"Sterility.—Freedom of the final product from living organisms, excepting in the few cases where these constitute the essential immunizing agents, is assured by the methods of preparing the material, and by tests for sterility. Sterility tests are generally carried out on the bulk preparation prior to filling the trade containers, and upon the contents of the latter as the material is ready for the market. The procedure for sterility testing must take cognizance of the presence of a preservative (if one is present), and must therefore provide for adequate dilution so as to bring about in the culture medium a concentration of the antiseptic sufficiently low to avoid its inhibitory action.

"While agar plates and ordinary broth tubes are used to some extent abroad in sterility testing, the most satisfactory means is to combine aerobic and anaerobic tests in one container. This is accomplished by placing the material in flasks of plain broth where the amount of material to be tested is large, or by the use of two-armed fermentation tubes after the design of Theobald Smith when the amount to be tested is small. All the oxygen is driven off from the broth in the long closed arm just before inoculation. Whichever container is used, the proportion of broth to inoculum should be such that the preservative, if phenol or tricresol, shall not exceed 1 part in 10,000 of the culture medium.

"It is desirable to test each lot of broth with an organism that does not grow very readily to determine whether it is satisfactory for the purpose for which it is intended.

"Certain special preparations, notably rabies vaccine, may cloud the medium in the fermentation tubes in such manner as to leave one in doubt as to whether contaminants are present. In such a case a transplant is made into a fresh tube of medium, and this transplant should remain free from turbidity or sediment if the material is free of living organisms capable of growing in the medium.

"The cultures used in sterility tests are examined after forty-eight hours' incubation, again after four days, and finally at the end of seven days. The two- and four-day examinations are necessary because a contamination may develop and be observable at an earlier reading but disappear before the final observation.

"Labeling.—Under the regulations drawn up in accordance with the law for the control of biological products, the label is required to show the proper name of the product; the name, address, and license number of the manufacturer; the lot number; a statement as to the potency of the product; and the expiration date. The manufacturer is permitted to utilize any trade name he may see fit to employ in addition to the officially authorized name.

"Dating.—The law referred to in the preceding paragraph requires that each package shall be marked with 'the date beyond which the contents cannot be expected beyond reasonable doubt to yield their specific results.' Under this provision of the law somewhat arbitrary requirements have been set up, since it is impossible to determine always how long a preparation retains its therapeutic or prophylactic activity. Glycerinated smallpox vaccine is permitted a maximum of three months on the market even under favorable conditions of storage. The antitoxins for which there are official standards are permitted one year if they are sent out with a 20 per cent excess of potency, and as high as four years if sent out with a 50 per cent excess of potency. Anti-bacterial sera in general are given one year, anti-meningococcus serum being an exception with but six months from date of manufacture. Bacterial vaccines in general and pollen extracts are given eighteen months.

"Standardization and Testing.—In standardization procedures it is the aim to measure if possible the therapeutically, diagnostically, or prophylactically active elements in the preparation, though there are not at present sufficient data to permit this in every case. This can be done, e. g., in the testing of antitoxins, but in the case of certain other agents—e. g., anti-meningococcus serum—there is no assurance that the immune bodies titrated—e. g., agglutinins, bacteriotropins, or complement-fixing bodies, depending on the method used—have any important part in the therapeutic activity of the material.

"In the United States there are standard units legally established for the antitoxins of diphtheria and tetanus, for those of Cl. perfringens (Cl. welchii) and the botulinum group and for that of the scarlet fever streptococcus. Control products are distributed by the Hygienic Laboratory for comparison in the testing of anti-dysenteric serum, anti-pneumococcic serum, and anti-meningococcic serum, typhoid and paratyphoid vaccines, scarlet fever streptococcus toxin for the Dick test and for immunization. Standardized methods are prescribed for testing the potency of smallpox vaccine, diphtheria toxin for the Schick test, diphtheria toxin-antitoxin mixture, and diphtheria toxoid."

It does not fall within the scope of this paper to deal with each biological product in detail. However, the control of two of the more recently elaborated products will be discussed.

SCARLET FEVER STREPTOCOCCUS TOXIN

Early in the work of the Drs. Dick on the use of the toxin of the scarlet fever streptococcus in testing susceptibility to scarlet fever these investigators used various dilutions of toxin in testing scarlet fever convalescents and also other individuals who gave no history of having had the disease. They named as "the skin test dose" the amount of toxin which gave a positive reaction in the majority of presumably susceptible individuals and a negative reaction in those convalescing from the disease.[1]

Using this method, the Drs. Dick determined the number of skin test doses in each cubic centimeter of a particular batch of toxin, which they turned over to the Hygienic Laboratory for use as a control toxin against which other toxins could be standardized. Since that time new toxins have been prepared and standardized at the Hygienic Laboratory from time to time in comparison with the original toxin or against other toxins so standardized. Samples of these control toxins are distributed to producers for use in the potency testing of preparations of this material intended for the market.

The preparation of scarlet fever streptococcus toxin is a simple procedure. Fluid medium, such as beef broth, is used. The addition of a small percentage of blood seems to be an advantage. If blood is added, it is taken from some animal other than the horse, since the possibility of sensitizing individuals to horse serum has been suggested. Scarlet fever streptococci are grown in this medium for a few days and then filtered out. A preservative is added to the filtrate and this toxic filtrate is then ready for standardization.

In the search for a method of standardization of this toxin, attempts have been made to find a species among the lower animals which is uniformly susceptible to the toxin, but so far these efforts have not been rewarded with any marked degree of success. It has been necessary, therefore, to resort to human subjects to standardize satisfactorily scarlet fever streptococcus toxin. In actual practice, the control toxin already mentioned is used to make skin tests on individuals, the site of inoculation usually chosen being the anterior surface of one forearm. Into the skin of the other forearm is injected 0.1 c. c. of a dilution of the toxin being standardized. Twenty-four hours later the sites of the inoculations are examined and the reactions, if present, are compared. This is repeated, using various dilutions of the new toxin until the dilution is found which, when tested on several individuals, will give reactions comparable in every way to the reactions produced by the control toxin. In this comparison, size of reaction, intensity of color and degree of swelling, if present, are taken into consideration. It has been found desirable to make these comparative tests on at least twenty individuals who are positive to the control toxin, including those giving strongly, moderately, and slightly positive reactions, and on at least ten individuals who are negative to it.[1]

When the potency of the new toxin has been determined in the manner specified, the toxin is available for distribution either for use in testing susceptibility or as an agent for the production of active immunity.

SCARLET FEVER STREPTOCOCCUS ANTITOXIN

With the introduction of this antitoxin into general use, the Federal Government, under the biologics law, was confronted with the problem of the method of potency determination just as it was in the case of scarlet fever streptococcus toxin. With the antitoxin, as with the toxin, the chief difficulty of standardization has been the lack of a suitable test animal. The Drs. Dick utilized human volunteers who were susceptible to the toxin. They found that when proper mixtures of toxin and antitoxin were made no skin reaction would follow the intracutaneous injection of the mixtures, although the individual tested would give a reaction to the toxin when injected alone.[2] Other methods have been tried for titrating the potency of this antitoxin, but so far without any marked degree of success.

In using the method suggested by the Drs. Dick, a fixed amount of toxin is mixed with different quantities of antitoxin. These mixtures are then used in making skin tests on susceptible individuals. By adjusting the dilutions, the volume injected is always 0.1 c. c. The amount of toxin used in the various mixtures of toxin and antitoxin is referred to as the test dose. The test dose most frequently employed contains five skin test doses.

In the titration of an antitoxin by this method it is of course necessary to make several injections in the same individual at the same time. First, we have the toxin control or susceptibility control. This consists of one skin test dose of

toxin. Then we may utilize anywhere from one to four or five or even more mixtures of toxin and antitoxin. For example, we will say that in addition to a test dose of toxin, the first mixture of toxin and antitoxin contains 1/4000 c. c. of antitoxin, the second 1/6000 c. c., the third 1/8000 c. c. and so on, if more mixtures are used. As some individuals are susceptible to the proteins in the serum, and in such cases the protein reaction will prove confusing, a serum control is used. This control injection contains the largest amount of antitoxin represented in any one of the mixtures of toxin and antitoxin. In the example referred to above, the volume of antitoxin in the control would be 1/4000 c. c. Reading of all reactions are made twenty-four hours after injection and since the toxin in some mixtures appears neutralized at the end of twenty-four hours, but gives a reaction later, a second reading is made at the end of forty-eight hours.

In reading the reactions the following criteria are observed: (1) the reaction to the skin test dose of toxin must measure at least 1 cm. in one diameter; (2) the serum control injection must not cause a reaction measuring more than four mm. in any diameter; (3) in judging neutralization of the toxin in the various mixtures, reactions measuring less than 1 cm. in any diameter are considered as indicating neutralization, while those measuring 1 cm. or more are considered as indicative of failure of neutralization.

In applying this method for the determination of potency it has been found that, due to differences in susceptibility in test subjects, mixtures of toxin and antitoxin, when injected into different individuals, may give different results. In one individual, for instance, 1/4000 c. c. of antitoxin may be required to neutralize one test dose of toxin while in a second individual less than half that amount of antitoxin may prove sufficient. Discrepancies of this nature greater than fivefold have been noted.

For the purpose of correctly interpreting irregularities in results and following the methods used in standardizing other antitoxins, a standard serum has been introduced. This serum was first dried to insure stability so that the standard of measurement might remain the same from year to year. After drying, samples were redissolved and tested on a sufficient number of subjects to warrant a definite statement of the neutralizing potency of the serum. This neutralizing potency is now expressed in units.

Until recently the potency of scarlet fever streptococcus antitoxin was stated in terms of the number of skin test doses of toxin which each cubic centimeter of the antitoxin would neutralize. To bring the expression of the potency of this antitoxin in line with other antitoxins in common use it seemed desirable to state its potency in terms of units. In order to avoid confusion in having doses of different sizes for similar products it further seemed desirable that the dose of scarlet fever streptococcus antitoxin should contain approximately the same number of units as the dose of diphtheria antitoxin. To bring this about, the size of the unit was so adjusted that the average therapeutic dose in use at present is from 6,000 to 10,000 units. Before the adoption of the unit, clinicians had found that the average therapeutic dose of scralet fever streptococcus antitoxin should be sufficient to neutralize from 300,000 to 500,000 skin test doses of toxin. The definite amount of the standard serum settled upon as the unit was defined as the neutralizing power possessed by a definite quantity of the standard serum which is preserved at the Hygienic Laboratory of the United States Public Health Service under special conditions to prevent deterioration. This quantity of standard serum is 1/40 c. c. of the redissolved serum as distributed from the Hygienic Laboratory. Ten test doses of toxin are neutralized by the unit. As the test dose of toxin contains five skin test doses, it will be seen that antitoxin sufficient to neutralize 500,000 skin test doses of toxin will contain 10,000 units.[3]

In comparing a new antitoxin with the standard serum, different volumes of both are each mixed with a test dose of toxin. Intracutaneous injections in individuals who are susceptible to the toxin are then made with the various mixtures. In reading the results the neutralizing potency of the mixtures of the new antitoxin is compared with the neutralizing potency of the standard. For instance, if on one test subject 1/400 c. c. is the smallest amount of the standard serum which will neutralize one test dose of toxin, and one-tenth as much of the new antitoxin, or 1/4000 c. c. neutralizes a test dose of toxin equally well, then the new antitoxin is considered to be ten times as potent as the standard. As 1 c. c. of the standard serum is equivalent to 40 units, the new antitoxin having ten times that potency contains 400 units per c. c.[3]

With increased familiarity with the peculiarities of the potency test for scarlet fever streptococcus antitoxin, the accuracy of testing by the

manufacturers has increased until at the present time it is felt that the potency of lots of this antitoxin now on the market is stated as accurately as the test will permit. Without the standard serum as a comparative control it is exceedingly difficult to arrive at a correct evaluation of a new lot of antitoxin.

The potency testing of this particular antitoxin is difficult. It is difficult to find volunteers for use as test subjects, and the test itself is tedious in performance and not always easy of interpretation. It is to be hoped that some simpler test may be worked out.

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DISCUSSION (*Abstract*)

Dr. B. L. Arms, Jacksonville, Fla.—How long can a physician carry diphtheria antitoxin, tetanus antitoxin, or vaccine virus in his car, and expect good results after their use?

I have heard and have seen, in going over the State, that certain drug stores keep their stocks of biologicals on the shelves, instead of iced; in fact, one man told me a certain biological representative gave him as one of the strong points in their products, that they need not be kept on ice.

Dr. William Litterer, Nashville, Tenn.—Does the Hygienic Laboratory require the various biological houses to make subdural inoculations into rabbits or guinea pigs of the Semple anti-rabic vaccine to determine its innocuousness before it is put on the market? In our experimental researches with this vaccine we found that less than five hours of 1 per cent phenal incubation of the macerated brain failed to infect subdurally inoculated rabbits, provided the brain was strained through a 100 meshed wire gauze instead of a double layer of gauze as is ordinarily employed. It may be that we are over-inactivating the virus and that a shorter incubation time would be preferable to give it greater immunizing powers and at the same time procure just as safe a vaccine.

Dr. H. S. Mustard, Murfreesboro, Tenn.—Some years ago we were vaccinating on a wide scale at Muscle Shoals, Alabama; smallpox was breaking out; we were making two parallel half-inch scratches. We noticed that we were not getting many takes, so we purchased an additional new batch of vaccine, used the back scratch for the old virus and the front scratch for the new. There was a marked contrast on the percentage of takes on the back scratch and on the front scratch.

In a county in Tennessee we have been studying the percentage of takes in vaccinations in warm months and cold months, and, in the winter, we can get about 98 per cent of positives; in the summer, we run down to a much lower percentage.

In school children, the bulk of vaccination for smallpox is done before school opens or immediately after. That usually, in the South, is a warm month and it means that we do not get so high a percentage of takes as is desirable. To overcome this we use a thermos bottle and have the virus shipped to us direct from the manufacturer.

I should like to know whether it would be practicable and worth while to make some studies in connection with deterioration of smallpox vaccine during shipment. Some health officers and nearly all private physicians pay particular attention to methods of storage used by the drug store from which they make their purchases. It seems to me of great importance to have assurance that the vaccine is kept sufficiently cool between biological house and wholesale and retail druggist. This applies especially to the warm months.

Dr. A. T. McCormack, Louisville, Ky.—During the War, Dr. Force, in Panama, made many experiments with vaccines. We had experience with the Indians who had not been vaccinated before. We found if we took our vaccine in bulk on ice, we had 100 per cent positives; if we left it out 24 hours, there were 60 per cent positives or takes; and, after longer periods off ice there were 33 per cent takes.

We have had about the same experience in Kentucky. If smallpox vaccine is taken from the car by the nurse over to the school house and kept in the open (where it is warm) the number of takes is reduced considerably. We are urging our health officers to take it in blocks of ice or in thermos bottles.

We are satisfied that if a child who is vaccinated shows a very mild take, it immunizes him against vaccination, but not against smallpox. There is no question that the vaccine should be shipped under precautions and kept cool in shipping.

Dr. C. W. Garrison, Little Rock, Ark.—In addition to the importance of standardization of biologicals, this Congressional Act has been of tremendous commercial value to the Country. Boards of health for a number of years have been making contracts with various biological houses at prices much lower than commercial rates. We have encountered the propaganda that board of health biologicals are of inferior quality, but we have been able to meet this argument by referring to the fact that the manufacture of all biologicals has been standardized by the U. S. Public Health Service Hygienic Laboratory and there is practically no difference in the products put out by any of the manufacturers. Some may be preferable because of more convenient containers.

Dr. Dyer (closing).—The dating requirements in the regulations for the control of these products take their deterioration into account.

Those engaged in the control of biological products take care to investigate as far as seems necessary any complaints of lack of potency or any questions of sterility of products.

Dr. McCormack's suggestion of using thermos bottles and iced containers for shipping vaccine virus is an excellent one.

ENDOCERVICITIS*

By W. F. SHALLENBERGER, M.D., F.A.C.S.,
Atlanta, Ga.

The endocervicitis to which particular reference will be made in this paper is the chronic type commonly seen after childbirth in both lacerated and unlacerated cervices. However, all types of endocervicitis should be given due consideration and every patient whose complaint suggests an endocervicitis should have a careful examination and proper treatment to relieve the condition if it exists.

The most characteristic symptom of endocervicitis is a discharge, usually muco-purulent in nature. A discharge of any kind is not only disagreeable and annoying, but is likewise disturbing to a woman's peace of mind and is a symptom that should never be minimized or disregarded. Other symptoms are backache, pelvic soreness and tenderness, a sense of weight and obscure abdominal and pelvic pains. The pelvic lymphatic channels extend from the cervix out through the broad ligaments and it is readily seen that a chronic infection in the cervix may play a part in various pelvic pathological conditions. In a rather extensive experience with the treatment of endocervicitis it has been demonstrated repeatedly that various undetermined and indefinite symptoms, not at first thought to be directly associated with that condition, have been relieved by clearing up the infection in the cervix. The simple procedure of puncture and destruction of Nabothian follicles in a cervix otherwise apparently normal has many times effected complete relief in obscure pelvic discomfort and pain. The cervix is undoubtedly responsible for certain pelvic symptoms.

Ureteral strictures are almost certainly secondary to endocervicitis in some instances and in sterility the cervix should be one of the first points of investigation.

The major percentage of leucorrheal discharges comes from the endocervix, seldom from the endometrium. In their histological structure, their physiological activity and their pathological reaction the endocervix and endometrium are entirely different. A discharge from the endocervix is mucous in character, that from the endometrium is serous. The epithelium of the endocervix is of the high columnar variety with many goblet cells. The glands are of the complicated racemose type and they dip down into the musculo-fibrous tissue of the cervix. On the other hand, the glands of the endometrium are lined with a low cuboidal epithelium with few if any goblet cells. They are simple tubular glands, have a characteristic interglandular stroma and do not extend down into the uterine wall. It is the deep-lying glands of the endocervix which permit the harboring of infection and make a chronic endocervicitis as common as a chronic endometritis is rare. This also demonstrates how futile a curettement would be in relieving a chronic infection of the endocervix.

We now come to the more serious phase of endocervicitis: the precancerous cervix. Cancer is probably never a primary development and wherever it appears there is invariably a preexisting lesion. Chronic cell irritation which is present in long standing inflammatory lesions such as occur in these neglected cervices, lesions which do not tend to heal of themselves, is without question a very potent factor in the causation of cervical cancer. The persistent effort on the part of the cells to carry on a reparative process gradually brings about a tendency to a reversion to an embryonic type of cells and this is the underlying reason why chronic cell irritation favors the development of cancer.

In the prevention of endocervicitis immediate repair of lacerations, as advocated by Emge and Bubis, should be carried out whenever feasible. Secondary repair should also be performed when necessary and a thorough cleaning up of all diseased cervices should be done as a routine before dismissing patients in the post-partum period.

Treatment of endocervicitis should be according to indications. Operative measures are in order where marked hypertrophy, elongation or lacerations of the cervix are present. Short radium treatments in the hands of Curtis and others have given good results. Diathermy and ionization have their advocates, but the actual cautery is probably the most reliable agent when

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properly employed. Astonishing results can often be obtained and a large distorted cervix can be restored to almost normal appearance by careful cautery treatments. The cautery point at low heat (Robins) inserted into the cervical canal for five to fifteen minute periods will usually suffice to clear up infection within the canal. The everted, exposed endocervix should be completely destroyed with the hot cautery point. In doing deep cauterization care must be exercised to avoid a subsequent stenosis of the cervix. When a sub-total hysterectomy is done, the endocervix that cannot be coned out from above should be destroyed with the cautery.

To recapitulate, cervicitis and endocervicitis are commonly neglected. Many indefinite and obscure pelvic symptoms are directly traceable to chronic cervical infections. Cervical cancer, which constitutes a third of cancers in women, frequently results from this neglect. Cancer in this location develops almost under our sight and touch. Every diseased cervix should be regarded as a potential cancer. This paper is a plea to those working in the field of gynecology to emphasize this point persistently and insistently. The time to attack cancer of the cervix, whenever possible, is before cancer has had a chance to appear.

DISCUSSION (*Abstract*)

Dr. Ernest Harl White, Little Rock, Ark.—I find the same trouble in treating endocervicitis as Dr. Shallenberger. My best results appear to be in those cases where I get good drainage through the cervical canal. This has led me to believe that proper drainage must be had in treating this condition no matter what agent is used. The electric cautery has given me some gratifying results.

Dr. William Neill, Baltimore, Md.—Our experience with radium has not been satisfactory and although Dr. Curtis has advocated its use in selected cases, I personally prefer the cautery. Electro-coagulation also has been discarded on account of the prolonged sloughing and in two patients rather profuse hemorrhage. Repeated linear cauterization with the actual cautery gives the most perfect result and is the method of choice. In the majority of cases no anesthesia is necessary and usually it can be satisfactorily carried out on the office examining table. It is important to precede the cauterization with direct applications of mercurochrome for several days, or some other antiseptic solution in an endeavor to clear up as much as possible the existing infection. Otherwise acute salpingitis has been known to follow and in one case of a colleague, death from streptococcus peritonitis.

Dr. Frank H. Walke, Shreveport, La.—I have been cauterizing these cases for the last several years. The treatments are given every six or seven days. If that is unsatisfactory I start zinc and mercury, copper or silver ionization into the cervical canal. We have silver or zinc erectures made to fit all canals. I use amalgamated electrodes sometimes with ordinary mercury or copper, but not the silver. Cyst drainage is very important, and also ionization directly into the tissues.

Dr. L. E. Burch, Nashville, Tenn.—If the general profession would only realize the necessity of exposing the cervix in all pelvic examinations, many conditions would be discovered that are now overlooked. The average man who makes an examination of the female genitalia (this remark does not apply to this body of gynecologists) makes only a digital examination and then draws his conclusion.

The cervix should be carefully inspected in all gynecological examinations, a biopsy should be made of any suspicious area, and a smear or culture of any unusual discharge.

I consider gonorrhea of the cervix a most difficult condition to cure. These cases should be hospitalized and studied very carefully.

A year and one-half ago I presented before the Gynecological Section of the American Medical Association a paper on gonorrheal cervicitis. I advocated an incision in the anterior and posterior lips of the cervix down to the internal os and then under the direct vision of the eye cauterization of the mucous membrane of the endocervix, following this with a pack containing an antiseptic. In a number of cases a cure can be brought about by this procedure. In others it will be necessary to follow it up by the application of an antiseptic for several weeks. One negative smear is of no value. Before a case is pronounced cured five negative smears should be obtained, the last one following menstruation. If this focus of infection is cleared up it will save the women recurrent attacks of salpingitis and pelvic peritonitis.

Dr. Shallenberger (closing).—I think Dr. White misunderstood my statement. I did not mean to advocate destruction of all of the endocervix, but merely to suggest that everted, exposed endocervix should be entirely destroyed and this means deep cauterization in order to get the deep-lying glands. In cauterizing the cervical canal care must be exercised to avoid a subsequent stenosis.

Curtis, in advocating radium treatment for endocervicitis, had in mind the production of a fibrosis. He gives only very short treatments to avoid tissue destruction or any effect on ovarian function. He reports excellent results from this procedure.

INFANTILE ECZEMA*

By C. O. KING, M.D.,
Birmingham, Ala.

From the period of bacteriology, when Unna sought a specific micro-organism for the disease, the conception of eczema has reflected every wave of medical thought. In 1913 the propaganda for vagotonia led to the atropin treatment. With the revival of constitutional syndromes, Czerny spoke of the exudative diathesis. In the newer studies of focal infection, tonsils have been implicated and good results reported following their removal. The present tendency to ascribe many symptoms to the phenomenon of allergy has found its echo in treatment; and the idea of hyposensitization to foreign proteins has come to its own. Meanwhile dermatologists have repeatedly emphasized the importance of local irritation and an inborn susceptible skin. Czerny presumed a type of child specifically predisposed to eczema and then attempted to influence the underlying constitution by changes in diet.

The term exudative diathesis was then conceived to describe the anomaly. The factor most influential in affecting this peculiar type of constitution was diet. Studies as to the effect of diet led to the implication of fat, and fat withdrawal became an essential to treatment. Hence, for the last decade the majority of medical men have believed that eczema in infants is due to a peculiar constitution, the so-called exudative diathesis and the ideal treatment of this predisposing constitution is a diet low in fats.

If one reviews the literature of the last few years, he finds that clinical descriptions of this syndrome vary greatly. Innumerable articles have been written, but with careful analysis of the literature the definiteness of the picture becomes blurred. No two men have the same idea of eczema, or if they have, enough symptoms are included to describe almost any pathological condition.

Infantile eczemas develop in the overweight and underweight, in those with adenopathies and those without, in those with flabby and those with firm, subcutaneous skin. True, the vast majority of children have blonde hair and blue eyes, and in all but the involved parts, skin of a very delicate, fine texture. These findings need not signify anything of a deep constitutional nature; they merely suggest a deficiency of pigment.

There are few daily clinical problems confronting the family physician and the pediatrician which are so trying to their therapeutic ingenuity as infantile eczema. The family physician is often hopeless of the control of these cases, falls a victim to therapeutic nihilism and, against his own conviction, advises the mother not to pay too much attention to the eczema so long as the child's general condition is good. Commonly this faltering advice is re-enforced by the statement that the baby will outgrow the eczema in time.

The frantic mother, worn out by sleepness nights and by the disfigured appearance of the baby, insists on relief and starts out to look for a baby specialist. He, understanding better the nutritional requirements, advises a more rational dietetic regime, but is able to give only a slight relief in cases of the acute and localized type. In the majority of cases, especially in the generalized type, the best dietetic efforts fail to relieve.

The general profession habitually loses sight of the fact that development and clinical evolution of the skin lesions proceeds along lines entirely different from those of visceral disease. The basic factor determining the peculiarities of cutaneous disease is that the skin is the only organ in the body on the surface and exposed to all kinds of external irritants, such as hot and cold air, wind, dust, decomposed skin secretions and scratching due to intolerable itching. For a gastric disorder caused by improper food, with restricted diet and thorough purgation, we eliminate the offending matter and the main source of the irritation is removed, which brings about the restoration of the organ to its normal state.

It is altogether different with the skin, since the constant exposure of the skin to external irritants renders its pathology more complex and leads to many secondary changes, independent of the primary systemic etiologic factor.

No factor stands out so clearly in the effective control of an infantile eczema as the correct dermatological interpretation of the clinical picture of individual cases. The majority of cases are handled in daily practice in a routine and uniform manner as if they were of one clinical type only. Yet there are several clinical types which differ widely both on etiological and morphological grounds and require entirely different types of treatment.

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*Read in Section on Dermatology and Syphilology, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

Attempts to divide the eczemas of the young into types depending upon the nature of the skin lesion is an antiquated procedure and quite impossible, since one small baby will show all types at one time on different portions of the body. Yet for the convenience of discussion from an etiological standpoint we have:

(1) Proteid anaphylactic eczema
(2) Toxic eczema, due to fats and sugar
(3) Hypothyroid eczema
(4) Seborrheic eczema.

From a clinical standpoint infantile eczemas may be divided as follows for local treatment: (a) wet or acute; (b) dry, acutely inflamed, subacute; (c) dry and rough or chronic; (d) eczema intertrigo; (e) diffuse, vesicular and infected.

(1) Proteid anaphylactic eczemas are characterized by an acute explosive and erratic manifestation, sudden outbreaks and equally sudden disappearance, with a predilection for the face and flexures of the arms and legs. This type seldom covers large areas of the body and ordinarily is present in single or multiple patches.

Morphologically, anaphylactic eczemas may be erythematous, dry papular or vesicular exudative. They sometimes present dry infiltrated thickened skin and still less often, lichenified skin. Due to scratching, the vesicular cases frequently assume an impetigous character. Facial edema is often found in the anaphylactic type, particularly around the eyes. In fact, they may be associated with urticaria and angioneurotic edema.

The skin lesions in this type represent primarily the expression of a constitutional error and the inability of an infant to adjust itself to life's contacts without the production of a definite, specific reaction which manifests itself in a skin lesion, a reaction arising from the protein sensitization. The offending proteins are operative through the ingestion of protein food substances, through contact of wearing apparel, or otherwise.

(2) Toxic eczemas due to the excessive intake or faulty metabolism of fat or sugar, present quite a different picture. They are more frequently seen in fat or over-fed children, while proteid anaphylactic eczemas equally often attack thin, malnourished children. This type is often associated with the seborrheic type and is commonly exudative, associated with heavy yellowish crusts and localized on face, neck and scalp. Most frequently we find in these eczemas a putrid stool with undigested fat or gas fermentation from excessive sugar and carbohydrates. It is also characteristic of the type to show a greater tendency to secondary pyogenic infection and spread and involve large areas of the body.

There is a comparatively small group of cases due to local skin irritants always from external sources. The cause in this group may be strong winds, soaps or irritating applications like turpentine and camphor. Exacerbations indignantly attributed by mothers to cod liver oil or milk too rich in fat may be traced to the irritation of acid stomach contents regurgitated over delicate cheeks. One baby gets worse on evenings when his unshaven father comes home and puts the baby's cheek to his own. The nasal secretion of coryza is not a very soothing lotion to these tender areas. Contacts with the powder from the mother's face, which may contain orris root, has been known to be an irritant.

It has been a tradition that infantile eczema and asthma are one: that with the disappearance of eczema, asthma sets in. A surprising number of cases of eczema never develop the slightest suggestion of asthma. Many children with asthma never give a history of eczema. Of course one must not forget that in some cases eczema and asthma may be due to an identical cause, for instance to plant pollen.

TREATMENT

The treatment of infantile eczema cannot be standardized or reduced to rigid formulas and stock prescriptions. The etiologic factors, morphologic type, stage of the disease, character of complications, localization, extent of involvement and many other details of local pathological condition must be considered.

The old time idea, prevalent in the general profession, that infantile eczema needs systemic and dietetic attention only, and that local treatments are of little importance has been strikingly refuted by the perfect helplessness of the general practitioner and the but slightly better success of the pediatrician in the clinical control of infantile eczema.

A pediatrician should certainly have charge of the dietetic side of the case and best results can be obtained only by the coordination of systemic and local treatment and by a full utilization of the modern technic of differential diagnosis, as well as all the resources of the modern drug and physiotherapeutic armamentarium.

Examination of the stools and especially cutaneous sensitization tests often give much in-

formation and many times greatly simplify the treatment. The cutaneous tests should be made by one who has thoroughly studied this work. The average dermatologist is too busy to take the proper care and time. As far as I personally am concerned, my efforts in this line have been a failure and I never attempt it any more.

The causation by proteid anaphylaxis is one of the most striking demonstrable clinical phenomena. However, the laboratory claims for diagnostic cutaneous food and pollen tests in infantile eczema have not, unfortunately, been borne out by clinical experience. Both pediatricians and dermatologists express their disappointment in using the method as a routine procedure, and I admit its value in individual cases only.

The main reason is the lack of constant parallelism between hypersensitiveness of the skin and the respiratory and intestinal mucosa, and technical deficiencies of the method.

In bottle-fed babies, dietetic control is simpler and rarely calls for the large number of cutaneous tests. In some instances the dermatitis is so severe, intense and general that cutaneous tests cannot be carried out. In these cases remove from the patient's environment all agencies to which eczematous infants are found most frequently to be sensitized, such as silk, wool, hair or feathers. The mother's diet should be investigated.

The outstanding symptom of eczema, which causes most anxiety to the mother and physician and suffering to the patient, is the almost intolerable itching. One agent, which knows practically no failures in relieving the itching and which I almost invariably resort to in the beginning, is ⅛ to ¼ of unit roentgen ray. Relief is the most important thing from the parents' standpoint, and if you give this quickly, their cooperation in the case will be doubled. Anethesin in 2 to 4 per cent ointment offers a modern, safe and effective anti-pruritic in some cases. Coal tar in chronic infiltrated cases acts admirably. The best preparation is made from picis carbonis, an English preparation of crude coal tar. This should be prepared by mixing thoroughly 30 grams of the tar with 30 grams of zinc oxid. Mix 4 drachms of zinc oxid and 4 drachms of white vaseline thoroughly, then mix the two. This makes a dark gray mixture, which is not irritating. If it is not made properly you get a greenish, sometimes black ointment, which is very irritating, due to a chemical change in the aniline dyes. A thin layer of this ointment should cover the affected parts and be held in place by a linen mask, if on the face. This is removed once a day with cold cream or oil and replaced during the day with a creamy mixture composed of 3 oz. each of zinc oxid, olive oil, lime water, 1 oz. lanolin and 1 per cent phenolis. Re-apply the tar at night and remove as before the next morning with the same application during the day. The time-honored devices and mechanical appliances for tying the hands to keep the infant from scratching must be branded as a relic of barbarism and implements of torture. A clinician, insisting on the enforcement of these cruel measures, is punishing his little patient for his own lack of knowledge of the modern, more humane and effective methods of treatment.

When it becomes necessary to clean the skin during treatment, olive oil, cold cream or oil of almonds on gauze should be used about once a week. To remove some of the grease or oil, the gentle application of cloths moistened with a solution of boric acid or a teaspoonful of borax in a pint of warm water may be used. Carbon tetrachlorid is also very efficient for cleansing greasy surfaces.

Let me emphasize once more that the most important factor in the successful control of infantile eczema by local measures is the individualizing of local attention in accordance with the stage and clinical type of the lesion, the degree of involvement, the parts affected and the nature of secondary complications.

One of the chief sources of therapeutic failures is the use of stock formulas and text book prescriptions. The basic principle of dermatologic therapeutics is that the more acute the stage of the skin condition, the more bland and soothing the application must be. As the process advances, the strength of the ingredients can be gradually increased.

Old washed linen or muslin is much preferable to gauze as a dressing in weeping eczemas. Surgical gauze is porous and will invariably indent itself into these raw surfaces unless a very thick layer of ointment is used. Gauze is disagreeable to remove and will produce bleeding and irritation and interfere with tissue repairs.

In the acute weeping types of infantile eczema, wet dressings of aluminum acetate act admirably in most cases. Occasionally the addition of a mild astringent as Goulard's extract to the aluminum acetate solution has a favorable action. These should be used for the first

few days; then begin with the tar ointment mentioned above. Boric acid ointment, with the addition of anesthesin or phenol, aids materially in relieving the itching. Butysin picrate ointment has been praised highly by some in the acute vesicular stage.

On account of the tendency to cake and crust, lotions of calomine and zinc do not act well. Where large areas of the body are involved, the addition of an oil to these lotions, as in Pusey's liniment, makes a comfortable and pleasant mixture. As this type gradually passes into the chronic or subacute type, where we find a thickening of the skin due to cellular infiltration, we have one drug which is known to possess to a considerable degree an absorptive effect on the infiltrate and that is tar. Crude coal tar or picis carbonis preparation (English) is best and should be made as described above. Oil of cade or oleum rusci is preferred by some; yet in my experience they do not compare with the English tar. A still less irritating, though more expensive ointment, is naphthalan, which is usually used in from 1 to 10 per cent strength. It does not irritate even the most tender skins.

Following the paper by Shatz on "The Use of Triple Distilled Water in Infantile Eczema," very successful reports have been made of its use. Two cubic centimeters are given twice a week in the gluteal muscles.

In seborrheic eczema, 1 per cent precipitated sulphur and 1 per cent salicylic acid or 2 per cent resorcin act well, in addition to roentgen ray.

Impetiguous eczemas usually respond readily to a combination of 2 per cent ammoniated and yellow oxid of mercury ointment. As a cleansing agent in these I use 2 per cent gentian violet and 4 per cent U.S.P. alcohol in distilled water, then apply the ointment above mentioned.

Intertriginous weepy eczemas respond well to aluminum acetate and lead water compresses. Our last resort, other than for the relief of itching in stubborn and intractable cases is actinotherapy. The marvels of modern physiotherapy have revolutionized dermatologic therapeutics and have completely routed the spectre of incurability of eczema strongly established in the layman's mind.

Some, very few, selected cases respond well to ultra-violet light. Radiation should be mild, just sufficient to produce a mild stimulating actinic effect, never approaching an erythema dose. Two or three treatments a week, beginning with 15 inches for 4 minutes and gradually increasing the time, are advisable. I recall three cases recently in which happy results were obtained by this means.

X-ray, admittedly our most powerful weapon, should be used only in the cases where other measures fail for its anti-pruritic effect. Its absorptive and anti-pruritic effect is also demonstrated in chronic infiltrated patches. I see no reason why the ordinary local applications cannot be used at the same time. One quarter of a unit, repeated one time in a week, or one-eighth repeated twice, acts well. One's apparatus should be accurate and utmost caution and care should be used in gradating x-ray dosage. One should have a complete understanding of the dermatologic aspect of the case and the capacity to observe and interpret correctly the slightest morphologic changes in skin lesions.

The precision of modern diagnostic technic and the modern therapeutic resources have transformed infantile eczema from a reputed incurable and intractable disease to one well amenable to therapeutic control and offering a very favorable prognosis.

DISCUSSION (*Abstract*)

Dr. Cosby Swanson, Atlanta, Ga.—Many of us believe that the most frequent cause of infantile eczema is error of diet, especially from excess of fats and carbohydrates or food hypersensitization. It may be due to focal infection and faulty elimination, or in many cases no cause can be found. I divide the treatment of infantile eczema as follows: I first treat the mother, then the infant. The treatment of the mother consists in correcting faulty elimination, regulating her diet, removing focal infection, giving large quantities of liquids, and instructions in regard to care of the baby.

In the treatment of the infant the following points are emphasized: diet, especially as to quantity and frequency of feedings. I usually allow the minimum quantity of food to maintain the weight and well being of the patient. Faulty elimination is corrected by laxatives and alkalies when indicated.

As to external treatment, for the acute and moist cases I use calamine-zinc lotion and 1 per cent phenol to dry up moisture, following this with a soothing salve such as Lassar's paste or tar ointment. In some cases tar ointment gives more relief than any other known local application, in both the acute weeping and the dry types. The objection to tar ointment is the odor and staining properties. If it is used more than three days at a time it often produces acute folliculitis. A non-irritating ointment has been difficult to obtain, but recently Abbott's Laboratories have put out a tar ointment, a preparation of Nelson and Ostenberg, in which the coloring matter and irritating prop-

erties have been removed. My experience with it has been limited, but results have been more satisfactory than with any other tar preparation I have used.

Dr. George M. MacKee, New York, N. Y.—There are two points mentioned by Dr. King with which I do not agree. I do not think that it is barbarous to use brute force to prevent scratching. Adults can be persuaded to use will power or to depend largely on anti-pruritic lotions. Of course, this cannot be done in infants. A little scratching will often undo a week of therapeutic effort. It is essential, therefore, that scratching and rubbing be prevented. A good nurse can accomplish much with anti-pruritic lotions and distraction, but there are times when the infant must be prevented from injuring the skin by fixation of his movable parts.

The second point is the turning over of eczematous infants to the pediatrician and to the immunologist. I am very much in favor of close cooperation between the various branches of medicine. I agree, also, that many infants must have their diet supervised by a pediatrician and in many instances the skin tests must be conducted under the supervision of an immunologist. But so far as possible the dermatologist should attend to these things himself. The old school dermatologist was an externist. The modern, thoroughly trained dermatologist is well versed in cutaneous medicine and he should be able to combat a dermatosis both from within and without. It is for him to decide when it is necessary to be an internist and when to be an externist; that is, some eruptions require only external treatment, some only internal treatment, while many require both. There is no fundamental difference between the problem of infantile eczema and the problem of external eczema. Eczema of infants, children, adolescents, adults and old people can be divided into clinical types. The recognition will prevent eczema venenatum and dermatophytosis from being treated dietetically and generalized neurodermatitis from being treated solely by topical remedies.

Dr. H. H. Hazen, Washington, D. C.—In certain infants infantile eczema later develops into neurodermitis.

We ought to be a bit guarded about the prognosis in cases where there is a tendency for the disease to locate in or around the neck, even at the early stage.

Dr. H. M. Robinson, Baltimore, Md.—For several years I have been working on this problem, and while looking up the literature came across the work of Towle and Talbott on fecal examinations in infant eczema. Confirming this work, I found that milk was the usual irritating factor in the majority of cases; that is, of course, excluding such factors as soap, talcum powder, cleansing oils and clothing. Only a few children did I find were breast fed, and in some of these we got results by merely correcting the mother's diet. In the rest of the patients, particularly those developing lesions shortly after being put on an artificial cow's milk diet, we decided (by history and sensitization tests) that milk was the cause. We found that only a few of our series improved if we eliminated fat and sugar from the milk. In the remainder we tried mechanical restraining procedures and the various crude oil tar prescriptions, and with these alone could not obtain permanent results.

I have hesitated to use x-ray therapy. There is always danger of telangiectasis and some patients are all too ready to sue.

Although it is generally believed that milk is an absolute necessity in the nurture of the child, I found myself compelled, at the urging of the parents, to attempt a milk and milk-product-free diet in the endeavor to cure our little patients of eczema. In the children's ward this has been quite easy, and in several of our cases we have obtained permanent results by the means of a substitution diet for milk. In one case, we found it necessary to stop baker's bread, there being sufficient milk in the bread to continue the irritation.

Dr. Ray M. Balyeat, Oklahoma City, Okla.—It is frequently asked: "If a child is not born specifically sensitive, why should he have eczema or hives from a certain food the first time he is given the food?" To clear up this point I tested 119 newborn babes with wheat, eggs and milk, and I found two specifically sensitive on the second day of birth. Therefore, I had to conclude that they were born specifically sensitive. However, this does not mean that they have inherited the specific sensitivity. Since the blood of the mother enters the blood of the embryo, the atopic substance to which patients become sensitive enters the blood stream of the embryo, and if they are born with the ability to become sensitive there is no reason why this sensitization should not have been conferred *in utero*. In that case the child is born specifically sensitive, but the sensitivity is not inherited.

Recently I studied a series of allergic patients which included asthma, hay fever, urticaria, migrain and eczema from the standpoint of inheritance, and I found that asthma and hay fever, eczema and asthma, hay fever and urticaria and migrain and asthma were all interchangeable in the linkage. This is excellent evidence, in my mind, that they are from one and the same source, namely: a specific sensitivity to some atopic substance.

There is no question that testing eczema patients for the specific sensitivity is most difficult, since the reactions are not clear-cut, but delayed. They should be read twenty-four hours after being applied, because the reaction is a small patch of eczema. The testing should be done by one who is very familiar with reading positive and negative findings.

Dr. King (closing).—It may be necessary to make a careful analysis of the mother's diet to obtain the causative factor in these cases.

Dr. MacKee's suggestion regarding applications for restraining the child in the very itchy cases is important. In some cases, where the itching is almost intolerable, mechanical restraints have to be resorted to. These in my opinion are few however, and a majority can be relieved by local applications. The point that I was trying to stress was that these measures are too frequently resorted to.

When it is definitely proven that milk is the cause of eczema it is a problem to arrange the diet for the child.

METHODS USED IN THE TREATMENT OF INGUINAL HERNIA*

By J. E. CANNADAY, M.D.,
Charleston, W. Va.

It is not the purpose of this brief paper in any wise to attempt to cover the field of inguinal hernia, but merely to dwell on a few points that I have found to be of practical value.

For the past several years my professional associate, Dr. E. B. Henson, and I have made use of the autoplastic suture method in dealing with the repair of this type of hernia. It has been amply demonstrated by experimental animal work that the autoplastic suture acts as a living graft and can be demonstrated months afterward; that this suture is not absorbed and is therefore permanent. Anyone who has repaired many inguinal hernias will, I am sure, agree with me that the value of a suture that will not cut out, will not be absorbed and will not cause tissue irritation, is very great.

So far as I know, McArthur[1], of Chicago, was the first surgeon in this Country to make use of the autoplastic suture in the repair of hernias. He made a report of his use of this method in 1904. Gallie,[2] of Toronto, Canada, made extensive use of the method and did much to popularize it. Following in the lead of these pioneers during the past several years, Australian, New Zealand and Canadian surgeons, together with many surgical workers in the United States, have made use of the method, some routinely in the repair of these hernias; others, like LaRoque,[3] reserve the method for hernias that either have recurred or look as if they were likely to recur, such as direct hernias. Masson,[4] of the Mayo Clinic, has given it an extended trial.

The use of the autoplastic suture, I take it, is merely an amplification of plastic methods applied to this problem. In the treatment of this, as well as in other forms of hernia, many methods have been tried, a few have stood the test of time, and most have been found wanting. No doubt many here even remember the wire filigree implant that was formerly used by a much-beloved member of the profession in St. Louis, Bartlett[5] by name. The following is an incomplete list of the suture material that I believe has been used: silk, linen, kangaroo tendon, catgut, silver wire and bronze wire. Like the multiplicity of remedies for a cold in the head, all have their handicaps.

Speaking with reference to hernia in general, the Mayos[6] made their contribution in the overlapping flap, and our Southern friend, DuBose,[7] devised the quadrilateral flap, which I still believe is the best possible flap for the closure of an umbilical hernia. Babcock[8] worked out similar results by the indigiting scheme, making the approximated fascia look like clasped hands. Numerous surgeons have made use of free fascial strips taken from the fascia lata for the repair of large hernial openings. There are a few principles, of course, that must be observed that are primitive essentials, such as the excision of the sac, the approximation of fascia in the closure, as like unites with like and not muscle to fascia, and the cleaning out of areolar and fatty tissue that might become interposed between fascia and interfere with the healing thereof.

It has been my custom to use two or more plastic sutures, starting the free end of both near the anterior-superior spine of the ilium, peeling off a strip lateral to Poupart's ligament down to the insertion of the said ligament and using these sutures to close the hernial opening up to and around the hernial ring.

Complete hemostasis is an essential. Comparatively large amounts of tissue should not be included in the bite of the hemostatic forceps, the aim being to seal the end of the divided vessel and nothing more. These small vessels should be ligated with fine plain catgut, double naught size being usually quite heavy enough.

My observation is that it is the strangulated form of hernia that is usually most poorly handled. There are certain handicaps and serious obstacles to be overcome here. The operator usually has no means of knowing the proximal from the distal end of the bowel. It would be hazardous and unwise and a waste of time for him to prolong the operation sufficiently to find out, when he does not know, for instance, by the near-by location of the cecum or some such landmark. Enterostomy drainage can take care of both ends if used in accordance with the method I am about to describe.

First: if the bowel is damaged but not dead the partially necrotic spots should be reinforced by suture.

Second: inasmuch as the damaged segment of bowel is likely to be the cause of mechanical obstruction, a suitable enterostomy should be

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done. I carry the intrabowel portion of the tube all the way through the damaged loop, the tube having previously been split spirally and a number of lateral openings made in its sides with scissors. The tube so arranged will drain from healthy bowel at both ends of the damaged segment.

Believing that the enterostomy opening should be protected and made as valve-like as possible, I have not only made use of the Horsley[9] method of securing it in the bowel, but have, when available, tucked omentum about it by suture or passed it through a perforation in the omentum. In case the omentum is absent, however, I have found that the appendices epiploica of the sigmoid made a most satisfactory substitute.

As to resection of necrotic bowel, an end-to-end anastomosis by the invagination method is by far the speediest type of anastomosis, also one of the safest as regards the possibility of leakage, always safeguarding the anastomosis by an enterostomy.

My observation has been that a considerable number of lives has been lost by dilly-dallying with makeshift methods in dealing with bowel necrosis. To secure results the surgeon should act with decision, accuracy and dispatch. Such methods as leaving both ends of the necrotic bowel in the hernial wound with a drain in each with the hope or the idea of anastomosis at a later date may be of possible value in certain cases, but generally speaking, a definite resection with anastomosis as previously described, will give by far the lower mortality.

A recent report has been made of cases in which damaged bowel later on became the seat of stricture by reason of fibrosis. Doubtless in at least occasional instances damaged bowel that appeared to be viable has been returned to the abdominal cavity and all seemed well for a time; later necrosis and disaster overtook the luckless patient.

Last year my associate, Dr. E. B. Henson,[10] reported one hundred cases of hernia operated upon by the autoplastic method. Since that time he and I have summarized one hundred additional cases, making a total of two hundred cases in which this method of repair has been used. While we have not been able to follow up closely all of these cases, we believe that the percentage of recurrences has been less than five.

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DISCUSSION (*Abstract*)

Dr. A. G. Rutherford, Welch, W. Va.—The treatment of hernia dates back a long time, and constitutes one of the major surgical problems of our industrial age. Surgical opinion is still divided as to what is the best procedure to be followed toward the permanent relief of this affection. The reason for this variance of opinion lies in the fact that cases vary as individuals and circumstances vary, and no one method is applicable to all cases.

The radical relief of inguinal hernia has an interesting history, but the operation of Bassini has stood the test of time, and to my knowledge has proved the most satisfactory in most cases. I subscribe to the views of Horsley, in that the most satisfactory operation in my hands has been that of Bassini, combined with the Halsted-Bloodgood modification of a flap from the sheath of the rectus muscle, and of the rectus muscle itself when the conjoined tendon is very weak. The careful isolation of the sac, its high ligation and transfixation under the internal oblique muscle, avoiding the incorporation of the ilio-inguinal and ilio-hypogastric nerves in the sutures, are all important steps which I always impress upon my assistants, regardless of the method of procedure they have been taught to follow.

We all admit that recurrences in the direct variety are far more frequent than in the indirect type.

Dr. Koontz, of Baltimore, has revived and emphasized the value of fascial sutures in this operation, well named "the living suture." This modification constitutes one of the most recent advances in this field. Strangulated hernia is one of the most acute surgical emergencies.

The most important part of the treatment of hernia is the post-operative. We can all do the mechanical work, but no two cases of hernia are exactly alike. These patients should be kept in bed for the necessary length of time. I know there is a divergence of opinion in the hospitals as to how long this should be. We discharge our patients on the eighteenth day. I think the twenty-first day would be better. Many recurrences happen if they are allowed to go earlier.

Dr. E. Bennette Henson, Charleston, W. Va.—The more I use autoplastic sutures in hernia the better I like the method for the reason that the technic can easily be altered to meet the anatomical variations found in hernias. Surgeons have often asked me how

to avoid tearing Poupart's ligament. If a to-and-fro motion is given the needle as it penetrates the ligament, tearing will not occur. Another advantage of the fascial suture noted is that the patient may be allowed out of bed early. I feel that early mobility is desired.

Dr. A. R. Koontz, Baltimore, Md.—I wish to thank Dr. Rutherford for giving me undue credit for applying the term "living sutures" to the autoplastic sutures, but the credit should go to Dr. Gallie of Toronto.

Statistics from the best clinics in the Country show that the percentage of recurrences following hernia operations is much greater than it should be. Anything that can be done to reduce this percentage is worthwhile. None of us wants to submit to the inconvenience, loss of time, expense and discomfort of a hernia operation, thinking that we have a 10-15 per cent chance of having to go through the same thing all over again in a year or so. Autoplastic sutures have greatly reduced this chance, if they have not entirely eliminated it.

Dr. McArthur, of Chicago, first brought out the autoplastic suture, but it never became very popular until Dr. Gallie reported his work, and certainly the results show far fewer recurrences when it is used by the technic which he advocates. I think that one reason it is not used more often is that we have to do another operation in order to get the suture material. This is time consuming, and patients do not like it. During the last several years I have published several papers on the use of alcohol preserved fascia instead of the living fascia. Experiments have shown that this works just as well as the autoplastic material. The collagen fibers are not changed either physically or chemically by preservation in alcohol, and when implanted among their fellows of the same kind there is no foreign body reaction or tendency to absorption, for it is not a foreign body that is being implanted, but material of the same type. Within a few weeks fibroblasts have grown into the implanted framework and a new vascular network is installed. We get the same result as when we use the living autosuture, and we obviate the second operation which is necessary to procure it. This material has been used all over the Country with good results. I have used it in about fifty cases, one of which had been operated upon five times before. I have had but one recurrence, and that was my own fault, in that I did not make a proper closure of the wound. The hernia was a large, post-operative one, and the lower border of the defect was the unyielding pubic bone which prevented proper closure. I should have bored holes in the pubic bone and run strips of fascia through them to close the defect. Failure to do this was responsible for the recurrence.

The alcohol preserved material is now on the market, and I consider it of great advantage in that it eliminates the operation on the thigh necessary to get the "living suture" of Gallie and LeMesurier. It differs from kangaroo tendon in that kangaroo tendon is absorbed, probably because the collagen fibers that compose it are altered both chemically and physically in the course of its preparation by chromacizing and heating processes. Besides, the kangaroo tendon is so hardened and twisted that it would be difficult for fibroblasts to grow into it, even if there were no complicating chemical and physical alterations.

Dr. C. N. Carraway, Birmingham, Ala.—In inguinal hernia there are two things to keep in mind: first, to get rid of the hernia; second, to repair it in such a way there is no recurrence. Gallie showed that 95 per cent of the recurrences were of the direct type. I believe that in the majority of cases in which there is recurrence after operation the patients have an indirect hernia which is present at the time of operation. I have found this to be the case by dissecting the transversalis fascia at the time of operation. I have found defects with small amounts of peritoneal fat bunched there, and if I had not repaired the transversalis fascia I am sure the patient would have had a recurrence. Andrews has avoided this by using the original Bassini technic. I have heard the criticism that it is impossible to find the transversalis fascia in large hernias. As long as a patient has a good intact transversalis fascia he will never develop a hernia.

Dr. Cannaday (closing).—If a type of suture material has been used that is rapidly absorbed, I believe it distinctly to the hernia patient's advantage to keep him quietly in bed for some time. If, on the other hand, the autoplastic or unabsorbable type of material has been used for suturing, we can leave the matter of getting up largely to the patient's desires. If my hernia cases wish to get up within a few days and I am satisfied with the suture material that I have used, I permit them to get up, sit in a chair or walk about the room, but do not allow them to go out of the room.

In regard to the alcohol preserved fascial suture material, if it has been found by laboratory tests and by animal experimentation that this type of suture material is better than chromicized catgut, our manufacturers should be able to supply us with kangaroo tendon prepared in this manner.

I cannot agree with Dr. Koontz that the alcohol preserved fascia suture material is physiological. I consider it in the nature of a foreign body and in introducing sutures of this should feel that I was introducing a foreign substance, and should expect the inevitable foreign body reaction of the tissues. I am quite sure that there will be less disturbance and less suture indigestion when the living autoplastic sutures are used.

Someone has said that a second incision is required to procure the autoplastic suture. In the average operation, as I have stated, it is easy to get sufficient suture material from the hernial incision. We can usually get two sutures in the average case which furnish quite enough material for the work in hand. I have had very satisfactory results with this method and have been much pleased with it. I feel quite sure that it marks a distinct advance over chromicized catgut, kangaroo tendon or other of the standard suture materials available.

THE HEART IN PREGNANCY*

By T. P. SPARKS, JR., M.D.,
Jackson, Miss.

The increasing mortality from heart disease in the past decade has caused a greater interest in cardiology. Regardless of the cause of the increase in the mortality from heart trouble, if we are to believe the statistics of the insurance companies, we are dealing with a generation whose hearts are not standing the strain of everyday life as did their predecessors of a generation ago. Those of us who are interested in obstetrics should be warned by these statistics of the contingencies with which we may have to deal in the coming years. If we have carefully examined the hearts of pregnant women in the past, we should examine them even more carefully now. Early diagnosis offers us our greatest opportunity to serve these women, for it is unquestionably true that many decompensations could be averted if proper treatment were instituted before signs of failure occurred.

During pregnancy and labor the heart is subjected to a strain probably greater than at any other period in a woman's life. During early pregnancy nausea and vomiting, possibly malnutrition, and the presence of fetal toxins are all an added burden to the heart. During later pregnancy the mechanical embarrassment to the circulation due to the growing uterus, the tortuosity of the vessels and the elimination of waste material are an added burden. In later pregnancy, too, there is considerable increase in the blood volume, but the viscosity is somewhat decreased. The vascular bed as a whole is much wider. This is due not only to the enlargement of the uterus, but to a general increase in weight. In normal pregnancy the average increase in body weight is about 20 per cent. This in itself calls for considerable added cardiac activity.

In response to this increased demand the heart must either hypertrophy to some degree or draw on the reserve, which is an inherent quality of every normal heart. Some observers, notably Mackenzie, believe there is no hypertrophy during pregnancy. Other observers, notably Frey[1], note an increase in the heart as shown by x-ray. Frey, in his series noted an increase of 0.7 cm. in the diameter of the heart in 50 per cent of women in the pregnant state as compared to the non-pregnant state. He also noted that the pulse volume per minute was increased in 57 per cent and the single pulse volume in 61 per cent, and by estimating the oxygen consumption of the blood per liter, he determined that the amount of blood ejected systolically before pregnancy was 86 c. c., and before delivery 108 c. c., the difference between the systolic ejection in the non-pregnant state and in the pregnant state at term being 44 c. c.

In a well trained heart the minute volume is increased with but little change in heart rate, although generally speaking the heart rate does vary widely in pregnancy.

In a heart whose reserve is being taxed the single cardiac contractions do not respond as well as in the normal heart, and an increased rate is necessary to eject the same amount of blood per minute. In many instances this compensatory increase in rate is the only change that occurs and pregnancy progresses with no other sign of a drain on the reserve, but this may not be the case. A compensatory tachycardia may precede by only a short period all the signs of a decompensation and, although as stated before, tachycardia is a frequent concomitant of pregnancy, it should not be taken lightly until proved to be of no consequence.

The incidence of heart disease in pregnancy has been variously estimated at from 0.25 to 2.8 per cent, depending probably upon the class of cases included as heart disease.

The mortality from heart disease has been variously estimated at from 3 to 60 per cent, also depending upon the class of cases considered.

There is such a wide divergence of opinion as to the seriousness of heart disease in pregnancy that one has difficulty in drawing an accurate conclusion as to its true status, but there is no such wide diversity of opinion as to the necessity of diagnosis of heart disease early in pregnancy, that treatment may be promptly instituted where signs of a break in compensation are imminent.

The time of appearance of symptoms and the type of lesion encountered largely influence us in the management of these cases. Failures occurring early in pregnancy should always give rise to a guarded prognosis, since the heart is failing at a time when it has not reached the period of greatest strain.

Oliver[2] regards myocardial failure as the most serious lesion complicating pregnancy. This

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lesion usually occurs in the older women, most of them multiparae, and is frequently accompanied by high blood pressure. Endocarditis is just as serious and the probability of carrying through labor with one of these complications is always extremely doubtful.

Mitral stenosis is regarded as the next most serious lesion, particularly if due to rheumatic fever where there are exacerbations of the preexisting infection. This lesion seems to have a peculiarly malignant effect upon the heart in pregnancy since, in addition to the obstruction in the pulmonary circuit due to the mechanical obstruction in the mitral valve, there is the added embarrassment of the pulmonary circulation from upward pressure of the abdominal contents as pregnancy advances.

British observers report a high mortality from failure due to mitral stenosis. Oliver[2] reports twelve cases, six of which died immediately after labor. Robinson[3] reports eighteen cases of mitral stenosis complicated by fibrillation, of which thirteen died either before, during or soon after labor.

American observers report less mortality from this condition. Schaupp[4] reports six cases of insufficiency of the mitral valve complicated by stenosis with no mortality. Daly[5] reports one death from mitral stenosis in nineteen failures. Five of these cases were complicated by fibrillation, four of which returned to normal rhythm. One did not.

Mitral insufficiency and aortic insufficiency seem to exert a less damaging effect on the course of pregnancy and are not regarded as seriously as the above mentioned lesions.

The symptoms and signs of heart disease in pregnancy are the same as in any other condition of life, but because several of these symptoms are more or less frequently encountered in pregnancy where heart disease is not present, there is probably a tendency to minimize their significance. Edema of the lower extremities is a valuable sign, but may be due to mechanical obstruction of the veins in the pelvis. Dyspnea is also a valuable sign of heart disease, but here, too, upward pressure may be the cause of the trouble. Tachycardia, mentioned above, falls in the same category. It may be the first sign of a tax on the reserve force of the heart or it may be due to one of many other conditions. The fact that these signs occur frequently where heart disease is not present does not justify one in assuming its absence, and a careful examination should be made to rule out heart disease.

The management of heart disease in these cases differs from the management of heart disease in general in that there is always the possibility of the added danger of an operative delivery either in the form of an interruption of pregnancy or some form of operative delivery at term.

In times past the opinion was generally held that heart disease, particularly in the presence of decompensation, was an indication for the termination of pregnancy. With the gradual accumulation of data tending to show that most women can carry through pregnancy even with a decompensation, the trend of opinion has changed and I believe there are relatively fewer interruptions now than formerly. There are certain lesions, however, which will always require an interruption of pregnancy if we are to serve the best interest of our patients.

In myocardial insufficiency and in febrile endocarditis, particularly in febrile endocarditis, interruption is always indicated, as it is extremely hazardous for these patients to attempt labor. The sooner pregnancy is terminated the better the prognosis. Schaupp reports five cases of endocarditis in pregnancy where four cases were terminated and one allowed to go to term. The patient allowed to go to term was the only one who died.

The management of cases having lesions other than myocardial failure and endocarditis becomes a matter of attempting by every possible means to conserve the cardiac reserve. If failure does occur and the heart muscle shows an inability to come back after a reasonable period of time under treatment, interruption is also indicated here, but statistics show that most of these cases will come back and interruption will rarely be necessary.

The anesthetic is important in these cases. I believe nitrous oxid and oxygen to be the anesthetic of choice if an operative procedure is indicated, but where it is not available my preference is for ether provided the surroundings do not contraindicate its use.

CONCLUSIONS

The literature on this subject is not large at present and the disparity in results reported

makes it difficult to draw accurate conclusions, but I believe that:

(1) Early diagnosis with institution of proper treatment will prevent many decompensations.

(2) If decompensation does occur, it does not necessarily indicate an interruption of pregnancy, as most of these cases will carry through pregnancy well.

(3) If interruption should become necessary, it should be done as early as possible, as the prognosis becomes more grave as pregnancy advances.

(4) Patients with endocarditis should not be allowed to attempt pregnancy. If pregnancy occurs, it should be promptly terminated.

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DISCUSSION (*Abstract*)

Dr. Richard Paddock, St. Louis, Mo.—In the past five years we have had the opportunity to see all the abnormal medical cases in the Obstetrics Clinic of Washington University Dispensary, and have followed heart cases through with the internist who is especially interested in medical conditions during pregnancy. The striking thing, in following these cases, is: in the first place, that most patients are not treated for their disease condition. They have not been properly treated, as they should have been, regardless of pregnancy. The first thing that comes to the mind of many internists, when they see a pregnant woman with heart disease, is to interrupt the pregnancy, and not to treat the heart disease. Bearing that in mind, we have attempted to treat our cases as the heart condition would deserve, and it has been our experience that most heart cases given proper treatment do exceedingly well in pregnancy. They should not be handled by a man who attempts to interrupt pregnancy without properly treating the heart condition.

Dr. Thomas B. Sellers, New Orleans, La.—In every abnormal heart case a cardiologist should be in charge throughout the puerperium and, if the lesion is grave, the cardiologist should be present during the delivery. The cardiologist can help materially in deciding the type of delivery (whether it should be a forceps delivery, cesarean, or whether the patient should be permitted to deliver normally.) There is no rule for handling heart cases during pregnancy. The cardiac reserve must be our indicator, as every patient presents a different problem.

HEALED CAVITY CASES*†‡

By J. H. McClellan, M.D.,
Oteen, N. C.

We have obtained the best results at this institution in healing cavities of the lung by following a routine treatment which I will try to outline briefly.

The treatment is begun with absolute bed rest; that is, 24 hours in bed daily, with bed bath, bed pan and tray service. Patients are continued in this status until there is no clinical evidence of activity, the sputum is negative for tubercle bacilli, and if cavities exist, until they have been closed for a period of three months.

The step following absolute bed rest is going to the toilet in a wheel chair, then walking one way to the toilet, and later walking both ways. The patient is next allowed to take his own bath, then allowed some time out of bed on a recliner, starting this with only ten minutes morning and afternoon, which is gradually increased to one hour. He is next allowed to go to a sun parlor, where his time out of bed is gradually increased to two hours daily. By this time, if he has shown sufficient improvement in his pulmonary condition and general condition as well, he may be considered a semi-infirmary case and is transferred to a semi-infirmary ward. Here his meals are still served on the ward, but he is allowed bathroom privileges and is allowed to rest on a recliner for one hour in the morning and one hour in the afternoon. In many cases no increase in time out of bed is made from one examination to another or from one x-ray to another. Therefore, the time that a patient should remain on semi-infirmary status cannot be stated definitely. It may be three months, six months, or sometimes even longer.

In my opinion, all patients on the ward should be doing the same thing at the same time. For instance, if a card is attached to one patient's bed, giving the number of minutes or hours he is allowed out of bed, at two hours, then all patients having two hours out of bed are as-

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†From the U. S. Veterans' Hospital.

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signed the same time from 8 to 9 a. m. and from 3 to 4 p. m. In this way there is more accuracy, they are less apt to disturb each other or to stay up too long. The nurse on the ward also has a record of the time assigned to each patient and can assist in the check. When patients on the same treatment have the same hours better results are secured because of group cooperation, which tends to eliminate possible individual friction.

After his period out of bed has reached approximately six hours daily he may walk to the main dining room for one meal each day. This walk should not consume more than four or five minutes each way. After a sufficient try-out and if he shows progress he may walk to his second meal and later to his third. About this time the patient may be considered for transfer to an ambulatory ward. Physical findings, x-ray, and clinical symptoms should now be those of an apparently arrested case.

It is on the ambulatory ward that actual exercise is begun. Occupational therapy is also begun at this time. The strictness of the supervision under which the exercise is taken is one of the most important factors. At this hospital it is not left to the discretion of the patient. After a long period of hospitalization and inactivity, the tendency of most patients is to overexercise due to their desire to be well quickly. Without supervision at this time many patients would retrogress. The patient is started out on a ten-minute walk morning and afternoon. Before leaving for his walk his temperature and pulse are taken and recorded and he is accompanied by an attendant who regulates the pace. At the end of the allotted ten minutes, when he returns to the ward, his pulse is taken. After reclining for 15 minutes his temperature and pulse are again taken. While on exercise the patient is checked frequently by x-ray and physical examination. If the reaction is considered good the walks and occupational therapy may be increased gradually.

In regard to the subject of passes or permission for leave of absence from the hospital, my experience has been that only patients who take the treatment conscientiously and faithfully are benefited by passes. A patient should be on the equivalent amount of exercise at the hospital that a pass entails before a pass is given him. The fact that a patient is on exercise does not mean that he is ready for a pass. There is no supervision over a patient while on a pass and here again much harm may be done by a patient who apparently thinks himself equal to the outing. Before a patient is considered for discharge as an arrested case his exercise should be carefully worked up to sixty minutes walking morning and afternoon and four hours occupational therapy daily. There are 35 or 40 subjects offered in occupational therapy work from which the patient may make his selection. Among the courses are stenography, commercial law, bookkeeping, leather work, and rug-making. Whatever a patient's former occupation may have been, he can always find something that will occupy his time profitably, give him exercise and be of use to him after he leaves the hospital.

After a patient has gone through the abovementioned gradual hardening process, and a final check shows that his x-ray, physical findings and clinical symptoms are compatible with those of a healed lesion, he is ready to go out and carry on a gainful occupation.

In our check-up with the x-ray many interesting things are found. I shall now present half a dozen cases, not selected from any particular group, which have come under my observation.

Case 1 (*9790*).—A white male patient was admitted to the hospital May 30, 1925. The diagnosis on admission was far advanced, active, chronic pulmonary tuberculosis. His sputum was positive for tubercle bacilli. This case being practically a unilateral one, pneumothorax was considered for a time. However, it was never instituted and the patient continued on bed rest. The sputum has been negative since September, 1926. He was discharged from the hospital April, 1928, as an arrested case of pulmonary tuberculosis.

The first x-ray examination of this case after admission to the hospital was made June 1, 1925. At that time the right lung showed a cavity 2.5 cm. in diameter in the upper third of the lower lobe. In addition, there was diffuse fibro-caseous involvement of the entire lower lobe on this side with a slight amount of diffuse fibrosis in the upper. The left lung showed diffuse fibrosis involving the upper third of the lower lobe. On December 11, 1925, a second examination showed that the entire left lung had practically cleared up, there remaining only a few nodules in the upper third of the lower lobe. There had also been general clearing throughout the entire right lung, but no reduction in the size of the cavity. On April 24, 1926, there had been marked contraction in the cavity in the right lung so that no cavity outline could be obtained. However, a dense fibrous mass, which measured 3 cm. in diameter, was present where the cavity previously existed. The fibrocaseous involvement of the right lung which was previously present was now represented by diffuse fibrosis throughout. On July 19, 1926, excavation had again taken place in the upper third of the right lower lobe, so that on that date the cavity measured approximately the same size as was shown on his admission to the hospital. Otherwise there had been no extension. On November 5, 1926, the cavity had again contracted

until there was no evidence of its presence. Gradual contraction of the fibrous mass in the location of the cavity took place between the examination on November 5, 1926, and the last examination, March 31, 1928. On the later date nothing remained at the site of the cavity except a small fibrous scar. The disease in the remainder of this lung, as well as that in the upper third of the left lower lobe, is now represented by small contracted nodular densities diffusely distributed, these nodular densities representing entirely fibrous lesions.

Case 2 (10,041).—A white male patient was admitted to the hospital in July, 1925, with the diagnosis of far advanced, active, chronic pulmonary tuberculosis and tuberculous laryngitis. The sputum was positive for tubercle bacilli. The larynx was later cauterized. The sputum has been negative since August, 1926. This patient was discharged from the hospital in March, 1928, as an arrested case of pulmonary tuberculosis. The tuberculous laryngitis was healed. The first x-ray examination was made July 29, 1925. At that time there was a cavity measuring 6 cm. in diameter in the left apex and behind the first rib. In addition, there was diffuse fibro-caseous involvement of the entire left lung with diffuse fibrosis involving the right upper lobe. From that date until May 11, 1926, the cavity in the left upper lobe remained practically the same size. There had been general clearing and contraction throughout the entire left lung, with contraction also of the fibrous lesions in the right upper lobe. On July 30, 1926, a slight reduction had taken place in the size of the cavity in the left upper lobe, and on October 4, 1926, the cavity was about one-half its original size. From that date to January 3, 1927, gradual clearing and contraction took place until the only abnormality present at that time was a small fibrous mass in the left apex and very small fibrous nodules diffusely scattered throughout the entire left lung and the right upper lobe. Further contraction of these nodules took place between March 2, 1927, and the last examination, September 26, 1928. At this time evidence of tuberculous involvement was very slight. There were small calcareous and fibrous nodular densities scattered throughout the entire left lung and the right upper lobe. This last examination was made six months after the patient was discharged from this hospital as an arrested case.

Case 3 (12,796).—A white male patient was admitted to the hospital August 13, 1927, with the diagnosis of far advanced, active, chronic pulmonary tuberculosis. The sputum was positive for tubercle bacilli. This patient weighed 108 pounds on admission and at present weighs 148. The sputum has been negative since December 7, 1927. This patient is still in the hospital and is now on supervised graduated exercise. The first x-ray on this patient was made August 15, 1927. At that time there was diffuse fibro-caseous involvement of both upper lobes, with a cavity 4 cm. in diameter in the right upper, and a large oblong cavity measuring 9x3 cm. extending from the apex of the left upper lobe to the upper border of the second rib. On January 5, 1928, the cavity in the right upper lobe had completely closed and in its location was a dense fibrous band about one inch in width which extended from hilum to the lateral chest. There was also a marked reduction in the cavity in the left upper lobe. This oblong cavity at this time had contracted in its center, resulting in two multilocular cavities, each measuring about 2 cm. in diameter. In addition to contraction of the cavities, marked absorption of exudate in both upper lobes had taken place. On March 9, 1928, the cavities in the left upper lobe had entirely closed. From that date to October 17, 1928, when the last examination was made, gradual contraction of the fibrous lesions and further absorption of exudate had taken place so that the pathological condition remaining was only diffuse fibrosis, involving both upper lobes.

Case 4 (10,495).—A white male patient was admitted to the hospital in November, 1925, with the diagnosis of far advanced, active, chronic pulmonary tuberculosis. The sputum was positive for tubercle bacilli. This patient left the hospital in November, 1927, and was re-admitted March 14, 1928. The sputum has been negative since March 20, 1928. This patient is still in the hospital and is now on supervised graduated exercise. The first x-ray examination was made November 12, 1925. At that time there were shown two cavities in the right upper lobe. The first, measuring 3 cm. in diameter, was in the first interspace; the second, immediately beneath it, measured 5 cm. in diameter. There was diffuse fibro-caseous involvement of the right upper lobe. The left lung showed diffuse fibro-caseous involvement of the upper and the upper third of the lower lobe. The condition remained stationary until February, 1926, but the examination in May, 1926, showed marked reduction in size of the large cavity in the right upper lobe with complete disappearance of the small one. In addition, there had been general clearing throughout the right upper lobe and throughout the left lung. On August 4, 1926, the cavities in the right upper lobe had entirely disappeared. General clearing and contraction of the lesions in both lungs took place between that date and October 24, 1927. At this time the only pathological finding in these lungs was a small fibrous mass in the right first interspace and small diffuse contracted nodules in the second and third right interspaces and the left upper and upper third of the lower lobes. The patient left the hospital in November, 1927, and was re-admitted in March, 1928. Subsequent examinations have shown no change over the last.

Case 5 (10,009).—A white male patient was admitted to the hospital in July, 1925, with the diagnosis of far advanced, active, chronic pulmonary tuberculosis. The sputum was positive for bacilli on admission and has been negative since May, 1926. The patient left the hospital in August, 1926. The first x-ray examination on this patient after admission to the hospital was made July 20, 1925. At that time there was present in the right upper lobe lying against the lateral chest a large cavity measuring 7 cm. in diameter, and there was a cavity 2.5 cm. in diameter at the base. In addition to cavitation there was diffuse fibro-caseous involvement throughout this entire lung. The left lung was clear. On November 19, 1925, marked reduction had taken place in the size of the cavity in the right upper lobe. It was multilocular at that time and measured about 4 cm. in diameter. There had also been considerable absorption throughout the entire right lung. The cavity at the base had undergone no change. From that date until July, 1926, when the last examination was made, gradual contraction took place in both cavities, with gradual absorption throughout the entire right lung. The pathological conditions at this time were a fibrous mass behind the second rib in the location of the cavity in the upper lobe and a similar mass at the right base at the location of the cavity in the lower, and diffuse fibrosis.

Case 6 (9227).—A white male patient was admitted

to the hospital in January, 1925, with the diagnosis of far advanced, active, chronic pulmonary tuberculosis. On admission this patient was very toxic. The sputum was positive for tubercle bacilli. He was a severe hemorrhage case for some time. He left the hospital against medical advice in April, 1927. First examination on this patient after admission to the hospital was made January 15, 1925. At that time there was diffuse fibrocaseous involvement of the entire left lung, with a large cavity 5 cm. in diameter in the upper third of the lower lobe. The right lung showed no evidence of involvement. The next examination, April 8, 1925, showed much the same condition in the left lung, but diffuse aspiration had taken place into all lobes of the right lung. At the next examination, June 25, 1925, the cavity in the left lower had become obscured by pleurisy which had developed over this location. On October 27, 1925, marked clearing had taken place throughout the entire right lung, with some clearing throughout the left, but the cavity in the left was still obscured by markedly thickened pleura. This cavity remained obscured until December 2, 1926. The examination made on this date showed that the pleural density had disappeared to such an extent that the lung beneath it was well visualized. The pathological findings in this lung at this time were small contracted fibrous nodular densities diffusely scattered through the left upper lobe and the upper third of the left lower. The right lung showed very small contracted nodules widely scattered throughout. Examination made February 24, 1927, showed the same condition.

NERVOUS INFLUENCE ON THE OCCURRENCE OF CARDIAC ARRHYTHMIAS*†

By DREW LUTEN, M.D.,
St. Louis, Mo.

A few decades ago it was customary for medical men to regard certain cardiac symptoms as manifestations of disorders of the nervous system. Such diagnoses as "nervous heart" and "nervous irregularity" were not infrequent. It had been known for a long time that the vagi and the sympathetic exert a profound influence on normal heart action, and it was but natural that this knowledge should be used to account for certain abnormalities.

With the advent of the electrocardiograph and other means of registering more exactly certain events in the contraction of the heart, many facts were added to our knowledge of the mechanism of normal contraction and of abnormal beats as well. With this increased knowledge the influence of the cardiac nerves was not disregarded, but attention became directed to the recognition of the different arrhythmias rather than to the explanation of their causes. With a better understanding of the point of origin and of the method of propagation of the impulse in these abnormal contractions, the cardiologist has emphasized the heart itself rather than its controlling nerves in his study of them. In explaining cardiac symptoms of any sort, therefore, the tendency during later years has been to minimize nervous influences; and the result has been that any such conception as a "nervous heart" has been rather pushed into the background. But the question must arise whether the influence of the nerves themselves in disorders of the heart beat is not often greater than is generally supposed. Certain aspects of this question might well be studied jointly by neurologist and cardiologist.

It has long been known that the heart muscle possesses the property of rhythmic automaticity. A complete explanation of this inherent property of heart muscle by virtue of which it elaborates and discharges impulses to contraction even now has not been reached. It is known, however, that this property exists in highest degree in the region of the sinus node and that this area, therefore, becomes the pacemaker. It is known also that the region of the pacemaker, the region of the sino-auricular node, is richly supplied with branches of the vagus nerves. It has been known for a long time that the vagi influence the rate at which the pacemaker initiates contractions. It is well known also that conductivity in the auriculo-ventricular bundle is under vagus influence. These and other facts relating to the dependence of physiologic cardiac properties on the cardiac nerves are taken for granted in cardiologic study and practice. Physiologists employ procedures which alter vagus and sympathetic tone in their study of many phases of heart action. Knowledge of the influence of vagus pressure, of respiration, and of atropin must be a preliminary to cardiologic practice.

It has been shown, furthermore, that certain abnormalities of contraction also are influenced by the vagus and the sympathetic. The rhythmic contraction of the heart is disarranged under certain circumstances and contractions occur arrhythmically. Graphic means of registration have enabled us to locate rather accurately the point of origin of these abnormal contractions; and extra systoles of auricular, junctional, right ventricular and left ventricular origin can be classified. Vagus influence on the occurrence of extra systoles is often demonstrable. Other ab-

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normalities of contraction such as auricular fibrillation and paroxysmal tachycardia are now known to be closely related in origin to extra systoles. That the cardiac nerves may on occasion be shown to affect these disorders, also, is a fact of importance in the study of their origin. The action of the more important cardiac drugs is known to be due in part, at least, to their action on the vagus. Just how much the action of digitalis on the auriculo-ventricular bundle, by virtue of which it depresses conduction in this issue, is a direct action on the muscle and how much it is an indirect, vagal, effect, at present cannot be surely stated. But it is well known that the vagal effect accounts in considerable measure for this action of the drug. The action of quinidin, by virtue of which it lengthens the refractory period of auricular systole and thereby stops auricular fibrillation in many cases, is largely a direct effect; but the indirect, vagal, action of the drug contributes to some extent toward this therapeutic result. With these and other well known facts at hand establishing a measure of vagus influence on the occurrence of certain abnormalities of the heart beat, as well as in the therapy of these disorders, it would appear that the question of the influence of the nervous system in producing such disorders under various conditions has not received its proper share of attention. It is with this general problem that this paper deals.

It is true that certain causes of extra systoles and allied disorders are recognized which at first thought might appear to have no relationship to nervous influences; but upon further consideration it becomes apparent that even in such cases nervous factors may not entirely be disregarded. Before discussing the question of the influence of the nervous system on the production of such disorders, brief consideration should be given to the incidence of extra systoles and to the theories of their causation.

The commonest example of vagus influence on the occurrence of extra systoles is exhibited in the matter of heart rate. It is well known that the incidence of extra systoles is highest when the heart rate is slow. In fact, in a case exhibiting frequent extra systoles, raising the heart rate will usually cause their disappearance. They are, indeed, rarely observed with a heart rate as high as 120 per minute. Now heart rate is mainly a matter of vagus tone. Slow rate means vagus stimulation. To say that extra systoles occur mainly with slow heart rates, therefore, is equivalent to saying that they occur mainly when the degree of vagus tone is high. This relationship of vagus tone to the occurrence of extra systoles involves a consideration of the theories of their occurrence. Whatever theory one accepts must include, as an integral part, therefore, this close relationship to vagus tone.

There are several theories of the origin of extra systoles. One is that the rate of stimulus production at the ectopic focus is abnormally accelerated. This might result either from a diminution of those forces which retard automaticity, that is, inhibitory influences, or from an exaggeration of those forces which accelerate it. The latter is sometimes referred to as increased irritability. It is well to keep in mind, however, the fact that heightened irritability and heightened automaticity are not necessarily the same thing. It has not been shown that forces which lower the threshold at which an external stimulus is effective in producing a contraction, that is, forces which raise irritability, necessarily lower the threshold at which spontaneous beats occur. It is not quite accurate, therefore, to speak of a spontaneous extra systole as being due to heightened irritability. It arises from heightened automaticity. Keeping this distinction between irritability and automaticity in mind, it may be stated that one theory of the causation of extra systoles is heightened automaticity. If one accepts this theory it is at once apparent that the cardiac nerves may be of profound influence in the production of an extra systole. A slight change in the balance between those forces which promote spontaneous contraction at any place and the forces which inhibit it might result in awakening a spontaneous beat at that point. The exact processes by virtue of which the vagus exerts its inhibitory action have never been elucidated, it is true; but it does exert such an influence. Any lessening of this inhibitory effect, either absolutely or relatively, therefore, might allow a premature beat to occur.

Another important theory of the production of an extra systole is that it is evoked, not by a new stimulus, but by re-entrance, into tissue which has just been in contraction of the wave set up by that contraction. Now re-entry is thought to depend upon a state of partial refractoriness. Re-entrance will take place, therefore, only at the end of the refractory period. Earlier than this the muscle is completely refractory; later it is not even partially so. Any factor, then, which influences the refractory period, particulary its length, might be decisive in

the production of re-entry. It is well known that the vagus has such an influence. Vagus stimulation shortens the refractory period. If extra systoles are due to re-entry, and if the conditions necessary for re-entry are affected by the vagus, it follows that the vagus may be of profound influence in the production of extra systoles. No matter which theory of the production of extra systoles is accepted, therefore, it is evident that the influence of the vagus must be given large consideration in explaining their occurrence.

It is not the purpose of this paper to enumerate or to review critically the theories of extra systoles or of other disorders of the heart beat. Attention is directed to some of these theories briefly in order to call attention to the fact that theoretical considerations harmonize with observed facts. Both emphasize the relationship of the vagus to the occurrence of extra systoles.

It was said above that in many cases extra systoles occur under circumstances which appear to imply little, if any, nervous influence. For clearness in discussion, one might classify extra systoles upon the basis of apparent nerve influence. Without attempting to make such a classification either inclusive or exact, the following will serve the purpose:

(1) Those which occur in patients with heart disease under circumstances which show no apparent nervous influence on their origin. In these cases surely there can be little doubt that the predominant cause lies in the heart muscle.

(2) Those which occur in patients who show neither nervous symptoms of any sort nor any evidences of heart disease except the extra systoles themselves. In this group, common causes are tobacco and infection. Examples of the latter are acute infections like grippe and focal infection. In these cases it is perhaps impossible to determine just how far the extra systoles are due to the effect of the toxin on the heart muscle and to what extent they owe their origin to its effect on the cardiac nerves. It is customary to emphasize the muscle, rather than the nerves in explaining them. Extra systoles due to drugs should be placed in this category.

(3) Extra systoles which occur under conditions that lower the general level of health. Fatigue and loss of sleep are common examples. In this group nervous influences on the production of the extra systoles are suspected at once. Fatigue, loss of sleep and lessened well being are the very things which are deleterious to nerve health. They may be injurious to other tissue also, and the heart may not entirely escape harm. But the predominant factor in these cases, surely, must be the nervous factor.

(4) Of reflex origin, particularly somatic or somatico-visceral. Examples are distention of the stomach from gas or from over-eating. In such cases the cause is almost entirely to be ascribed to nervous influences.

(5) Resulting from mental or emotional stress. Many examples might be given. A young man who was subject to paroxysms of tachycardia suffered such an attack when angered. A woman whose husband was seriously ill had frequent paroxysms of auricular fibrillation of varying duration. Before this such attacks were rare. Over a period of ten months subsequently such attacks have occurred rarely if at all. A man 47 years of age was gravely distressed. For the first time in his life he noticed that his heart "missed" occasional beats. The irregularity was found to be due to extra systoles.

(6) Due to nervous or neuro-mental disease. This group is closely related to the preceding one. The question whether such cases may indeed occur forms the basis of this paper. There is much evidence that extra systoles may on occasion occur solely as an expression of disorder of the nervous system.

A man about forty-five years of age who had been under the observation of competent neurologists since his childhood was examined a few months ago. The neurological diagnosis was vagotonia. He had many phobias and many symptoms. Among the latter were those associated with extra systoles and short paroxysms of tachycardia. Nervous disease was evident, but aside from an occasional extra systole there was nothing either in the history or upon examination to attract attention to his heart.

A proper discussion of the question whether this patient's arrhythmia was indeed only an expression of nervous disorder involves the whole problem of the production of extra systoles and of the influence of the cardiac nerves upon their occurrence. It is a problem of much complexity. The following hypothesis is suggested:

Some predisposing cause of a certain degree of potency may be present in the heart which tends to evoke an extra systole. Opposed to its occurrence are other factors. These opposing factors are influenced by the vagus and the sympathetic. This nerve influence, as well as the primary cause, may exist in varying degrees. Change in nerve tone might then be the deciding factor in the occurrence of the extra systole. The predisposing factor may be

thought of as a "latent cause." In many cases it is not apparent; in others it is easily demonstrable. In still other instances, such as definite heart disease, it is so obvious that it can hardly be referred to as latent. The potency of the cause, then, may exist in all degrees. If strong, it will overcome ordinary nerve influences and extra systoles will be frequent. If the degree of potency is somewhere near the mid-part of the scale, a slight change in nerve tone might precipitate an extra systole, while if the degree of potency is slight, considerable change in nerve tone would be required. As an example of vagus influence in precipitating extra systoles, reference may be made to the fact that the incidence of extra systoles is highest when vagus tone increases abruptly. Respiration notably produces such change in vagus tone, and it is a common clinical observation that respiration not infrequently will evoke an extra systole.

In the Heart Station of the Washington University School of Medicine at Barnes Hospital we have been interested in the changes in form of the electrocardiogram produced by respiration. For about two years we have had the patient breathe deeply during the taking of both the first and second leads of the electrocardiogram. Although we were aware of the above mentioned influence of respiration on the production of extra systoles in patients predisposed to them, we have been surprised to find that a large number of records show one extra systole with expiration and none in other portions of the record. In many of these cases it had not been suspected that the patient exhibited extra systoles. In these cases, obviously, there was a "latent cause;" the precipitating cause being change in vagus tone. Such, it would appear, may be the situation in the purely nervous cases. Here it may be that the latent causes are indeed physiologic processes. The nervous system, exhibiting a state of unstable equilibrium, is in the precise condition most favorable to the production of these disorders of the heart beat.

What has been said regarding vagal influence on extra systoles may apply in a general way to certain other abnormalities. It has been demonstrated that auricular fibrillation and paroxysmal tachycardia bear a close relationship, so far as origin is concerned, to extra systoles. In discussing the influence of the cardiac nerves and of the nervous system generally on the occurrence of these disorders, therefore, one may with certain limitations, of course, use the term "extra systole" to apply to all of them. It may at least be said that if nervous influences are important in the production of extra systoles, the importance of such influences may be assumed in the production of the other disorders.

This paper does not attempt to evolve any new theory of the causation of extra systoles and similar disorders of the heart beat. It takes account of demonstrable nervous influences on their occurrence and suggests certain lines of investigation in harmony with observed experimental and clinical facts. The suggestion is made that these disorders may exist as purely nervous phenomena in a larger proportion of cases than it has been customary during more recent years to suppose.

The occurrence of extra systoles and of paroxysms of tachycardia in any case should call for an examination of the heart, but it need occasion no surprise, in certain nervous disorders, to find that the nervous system itself, and not the heart, is primarily responsible for the occurrence of the disturbed rhythm.

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DISCUSSION (*Abstract*)

Dr. Ellsworth Smith, St. Louis, Mo.—The brilliant studies of Keith and Flack demonstrated the sino-auricular node in man as the site of origin of the automatic rhythmical cardiac impulses, which spread thence over the auricles as a wave and reach the auricular node of Tawara. This node of Tawara constitutes the first part of that muscle bundle described by His over which the wave of contraction is conveyed across the auricular ventricular groove and it spreads through its right and left divisions, throughout the right and left ventricles forming the arborization of Purkinje.

These fascinating researches naturally, I say, led physiologists and cardiologists away from some of the older notions of the past played by the extracardiac nerves in the heart's action, for it was thought that in the pacemaker, in the node of Tawara and in the bundle of His, were to be found complete explanations of all phenomena of the heart's action. In spite of this new view, however, there still remained two large plexuses of nerves: the superficial and deep cardiac plexuses formed from filaments from the vagus nerve and the sympathetic fibers springing from the superior middle inferior and stellate cervical ganglia, these superficial and deep cardiac plexuses forming the anterior and posterior coronary plexuses, filaments from which accompany the ramifications of the coronary vessels, communicating freely with the Keith and Tawara nodes and the bundle of His.

Surely this extraneous nervous supply to the heart connecting this organ through the extensive communications of the vagus and sympathetic nerves with nearly all regions of the body must exist for a definite purpose.

Dr. Luten has accentuated the inhibitory action of the vagus on the heart so that when the tone of this nerve is raised the rate of the organ is lowered; the rate of the organ being accelerated when the tone of the nerve is depressed.

We should like to add here that the accelerating action of the sympathetic is also a definite factor in the increase in heart rate, a view that was overlooked for a while because physiologists had not succeeded in provoking attacks of tachycardia by stimulation of the sympathetic. Later on, however, Hering, and more especially Rothberger and Winterberg, have shown that with stimulation of the sympathetic, attacks of acceleration of the cardiac beats can be produced which begin and end abruptly like those of paroxysmal tachycardia. In this way Sarini has explained paroxysmal tachycardia occurring in thyroid and ovarian disorders. Thus we see that the power of automaticity, or the ability to originate rhythmic impulses or contractions, is doubtless inherent in the cardiac musculature itself, while the regulation of the rate and rhythm of these impulses is largely under the control of the vagus inhibitory and the sympathetic accelerator influences. The rate slows should the vagus influence predominate, and increases when the sympathetic influence prevails.

Vaquez says (p. 47) on this point: "It is difficult to specify exactly the respective roles of the nervous system and the (specialized) muscle cells in the mechanism of these phenomena; nevertheless they (the extracardiac nerves) intervene constantly in order to retard or accelerate the (cardiac) rhythm."

Precisely, then, on such different influences coming to the heart through its connections with the wide distribution of the branches of the vagus and sympathetic nervous systems must rest largely the explanation of many of the arrhythmias.

ACUTE OSTEOMYELITIS AND COMPLICATIONS*

By N. D. Bitting, M.D., F.A.C.S.,
Durham, N. C.

Acute osteomyelitis is chiefly a disease of childhood and occurs most frequently between the ages of two and twelve years. Location of the primary infection is usually in the cancellous portion of the long bones, adjacent to, but not involving the epiphysis, unless it be late in the course of the disease. This is due to the fact that the periosteum at the epiphyseal ends dips into the epiphyseal line, is densely adherent to the cartilage and is not continuous with the periosteum covering the epiphysis. It is at this point that the infection often breaks through, due to the thinness of the cortex. The cancellous bone is more vulnerable on account of the looseness of its structure.

Eitology.—Acute osteomyelitis usually results from a primary focus of infection in some other part of the body, the infecting organisms being transmitted by the blood stream. The staphylococcus is most frequently the infecting organism, owing to the fact that it is very prevalent in skin lesions such as abscesses, boils, carbuncles, infected wounds and abrasions. In a small group of cases on my service the staphylococcus was the sole offending organism and metastatic foci of infection were present in most of the cases. The blood contained the staphylococcus in pure culture.

The streptococcus, pnuemococcus, colon, typhoid and paratyphoid bacilli sometimes produce the disease. Drs. George L. Carrington and Wilburt C. Davison reported a case of multiple osteomyelitis in which the *Bacillus paratyphosus* was present in pus obtained from multiple foci and in the blood stream (vol. 36, *Johns Hopkins Hospital Bulletin*).

Anemia and malnutrition are perhaps the greatest contributing factors. This is well demonstrated by the fact that a larger percentage of poorly nourished children living in crowded cities become infected. Injury is, to a lesser degree, a contributing factor.

Pathology.—The seat of the lesion is most often in the cancellous tissue of the long bones. This tissue is less resistant, and allows the infecting germs to take hold and spread the disease. The cortex is thinner in this region and the infection breaks through to the periosteum, which becomes thickened and stripped from the bone. As tension increases the periosteum will rupture and give rise to abscess formation in the soft parts.

The infection rarely extends into or below the epiphysis. Arrest of the disease may take place at this point if prompt and thorough treatment be instituted. If treatment be delayed the process will enter into the chronic stage and sequestration will gradually take place. The medullary canal may become infected by extension from the subperiosteal region through the Haversian canals.

Clinical Signs and Symptoms.—Pain is the constant early and dominant symptom. It is usually located near a joint, is throbbing in character and of great severity. This is accompanied by a definite point of local tenderness in the vicinity of the joint. However, the joint can be moved freely without pain, if handled carefully.

Toxemia appears early and is recognized by headache, dry tongue, malaise and sometimes vomiting and prostration. Temperature elevation reaches 103 or 104° and the pulse rate is correspondingly increased. The patient appears

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ill and often has a chill. The polymorphonuclear leucocytes are increased to twenty-five or thirty thousand. These are the chief clinical symptoms to be noted during the first twenty-four to forty-eight hours, before the infection has reached the periosteum. After this occurs, redness, swelling and increased tenderness appear about the area of infection. If treatment be delayed beyond this time rupture of the periosteum may occur with redness, swelling and fluctuation about the neighboring joint. The movement of the joint will then become painful and restricted. After perforation of the periosteum tension is relieved and the pain gradually subsides. In some cases a second point of infection occurs, forming a bone abscess.

The diagnosis can be made from the history of the case, together with the clinical signs and symptoms. Severe pain in the vicinity of a joint in a child, accompanied by a point of extreme tenderness at or near the epiphyseal line of a long bone, high temperature, rapid pulse, marked signs of toxemia and a polymorphonuclear leucocytosis make the diagnosis of acute osteomyelitis justifiable. An early diagnosis is essential if we are to avoid a long continued illness and incurable complications.

X-ray findings are of little or no value during the first few days. After considerable damage has been done the x-ray will be positive. If the clinical picture does not establish the diagnosis exploratory incision through the periosteum with drill holes into the cancellous bone is justifiable. If free pus be not present cultures should be made from the bone debris.

The differential diagnosis will determine to a large extent the plan of treatment to be carried out. It is, therefore, highly important that a correct diagnosis be made as early as possible. Acute osteomyelitis is most often mistaken for acute rheumatic fever. However, the latter disease can usually be differentiated by its polyarticular manifestations, which produce severe pain on manipulation of the joints; whereas the former presents monarticular signs which are in the vicinity of the joint. Manipulation of the joint is much less painful and the leucocyte count is higher.

Infective arthritis resulting from the gonococcus, pneumococcus or influenza bacillus will confuse the diagnosis, but the history, together with acute monarticular signs, will often differentiate these infections. Aspiration of the joint and culture of the fluid will confirm the diagnosis.

Cellulitis in the region of a joint must be differentiated. This can be recognized by the early swelling and redness, which appears late in cellulitis complicating acute osteomyelitis.

Complications.—Practically all cases of acute osteomyelitis are accompanied by a bacteriemia. This is revealed by a blood culture and if the organisms be of great virulence a generalized septicemia may develop and go on to a rapid and fatal termination. Secondary foci of infection occur in a certain percentage of cases. We have seen multiple abscesses located at points far from the site of the original lesion.

Bone abscess may develop after the acute symptoms have subsided. This should be suspected and identified by x-ray examination. Serous effusion into a neighboring joint resulting from hyperemia of the synovial membrane sometimes complicates the clinical picture. This condition rarely goes on to pus formation.

Lastly, pathological fracture due to rapid bone destruction and rarefaction is prone to occur and should be guarded against by immobilization of the limb.

Treatment.—Much can be done to prevent the disease by the use of wholesome nourishing food, sun light, fresh air in abundance, and the elimination of over-crowding and bad sanitary conditions.

All superficial wounds and cutaneous infections such as boils and infected blisters should be properly disinfected and protected.

Whenever the diagnosis is established or even strongly suspected, surgical interference is demanded at once. From what has been said in considering the pathology it is obvious that the earlier treatment is begun the sooner the pain and toxemia will be relieved and the less destruction there will be to the bone.

The dominant factor in the treatment is the relief of tension beneath the periosteum and in the cancellous bone. This is accomplished by making an incision over the point of greatest tenderness through the soft tissues and periosteum to the bone, taking care not to go below the epiphyseal line, thereby endangering the adjacent joint. If free pus be encountered this may be sufficient to relieve tension and prevent further spread, because the cortex has already ruptured and allowed the pus to escape into the subperiosteal space. However, drainage will not be adequate unless an opening be chiseled in the cortex. If no free pus be found beneath the periosteum multiple drill holes should be made through the cortex to allow escape of exudate from the cancellous area. Care should be

exercised not to open the medullary canal, as this will tend to spread the disease up the shaft. If no infection is found little or no harm will result and if infection be present extensive disease, protracted illness and deformities will very probably be prevented.

Supportive treatment in the form of normal saline subcutaneously or glucose intravenously is desirable. The anemia and toxemia are better combated by blood transfusion repeated at proper intervals.

Serum and vaccine therapy are of little or no value.

CONCLUSIONS

(1) Diagnosis within the first forty-eight hours, followed by prompt surgical interference, will greatly lessen the time of hospitalization, morbidity and deformity.

(2) Positive x-ray findings will not be obtained during the first forty-eight hours.

(3) All cases accompanied by a severe bacteriemia will obtain most benefit from repeated blood transfusions as an aid to the surgical treatment.

(4) After free drainage has been established proper immobilization of the limb should be done to prevent fracture and deformity.

DISCUSSION (*Abstract*)

Dr. J. S. Gaul, Charlotte, N. C.—I question whether orthopedic surgeons see acute osteomyelitis early enough to be competent in its treatment. We should lay more emphasis on the etiology and the preceding history.

Many cases of acute osteomyelitis are due to a local trauma and in these the disease is limited to the traumatized area. The hematogenous types are more diffused. The infecting organism determines to a large extent the amount of destruction of the bone which will take place, this being notably true in the pneumococcus infections. Again, in *Streptococcus viridans* infections the condition presents itself as a greenish cheesy mass often resembling Roquefort cheese. In these types of infections I seriously question that early incision plays much part in the final outcome of the individual case.

The inability of the patient to withstand pressure over the involved bone should make us suspect an acute osteomyelitis. When rheumatism or growing pains are mentioned in any given case we should assume a synonym for them and this should be acute osteomyelitis.

Under the heading of complications, I would add amputation. It has been rather appalling to note the number of amputations being done in osteomyelitis. The economic factor is given as the reason.

Under treatment, if the case is seen early, with the ordinary types of infecting organisms, early incision is advisable provided the patient has not an overwhelming bacteremia, in which case he should be given supportive treatment, blood transfusions, and we should avoid the additional operative shock, which often is sufficient to produce death. Conservatism often will permit the localization of the process within the bone.

After localization many of the metastatic lesions often seen are due to opening up the portals of entry within the bone itself in the operative procedure to reach the infectious process.

Dr. R. Wallace Billington, Nashville, Tenn.—We should remember that there is also a milder type of osteomyelitis which causes very little bone destruction, is soon localized, may even heal without any large amount of pus formation, without rupture, and without draining. I see no more acute cases in the first twenty-four hours than I did fifteen years ago. I do not see many cases that are operated upon early. As Dr. Gaul has said, I am not sure how much good we can do by operating at that time, though I have been advising it for fifteen years and am still preaching early drainage. I should like to ask Dr. Bitting how many cases he has seen operated upon in the first twenty-four hours, and what has been the result.

Of course there is no question that when we operate early the only thing to do is drainage. After that, let us wait until there is a definite shell of new bone formed around the bone destroyed by the diseased process, enough to preserve continuity of the bone. Then remove the dead bone and you can tell what its limitations are. If you do this too early you are in danger of removing too much bone. In a case that I saw recently the tibia did not regenerate and, of course, that is a very serious complication.

Dr. Allen Voshell, University, Va.—I wish to put a theoretical question to Dr. Bitting. Suppose he goes into a bone or operates upon the periosteum and finds the bone bathed in pus. If his original theory is correct, it seems to me he should go ahead and go through the cortex for a complete drainage from the center of the diseased condition. If he opens the cortex he is likely to carry an infection into it.

Which would be better, to run the chance of spreading the infection or to try to short-circuit the destruction of the bone in the early stages?

Dr. Wm. S. Baer, Baltimore, Md.—We should recognize osteomyelitis earlier than we recognize appendicitis. We have gone through the same stages with osteomyelitis as with appendicitis. First, we did not recognize appendicitis until it became peritonitis; then, later, we recognized acute appendicitis; later, only the abscess, or chronic appendicitis.

The time to treat acute osteomyelitis is in its incipiency, and to my mind the destruction is a question of tension. Early operation before any diagnostic signs are present by x-ray is necessary. Only the diagnostic signs of elevated temperature and pain at the localized point demand our immediate interference. The interference should not be radical, but should go down through the periosteum and even into the bone because we are not dealing with periostitis, but with osteomyelitis. And if we go down into a localized abscess and into the bone itself, we shall so localize the expansion of the process that we get a slight chronic osteomyelitis, which is self-limited. The question of treating chronic osteomyelitis is, therefore, quite different.

I am going to take the liberty of making a preliminary report on chronic osteomyelitis and its treatment by a violable antiseptic, and I am so certain of my ground that I should like to put it on record, although

the report is based on only two cases of treatment by the violable antiseptic.

During the war I saw three cases of men on the field seven days with a wound extending from the knee up to the thigh. Two of them included the bone and went into the scrotum. They could not eat, they should have been dead; they were not. They should have had septicemia; they did not. Why not?

We opened the wound to look. One had the most horrible looking wound, filled with maggots. On washing the wound out we found pink granulation tissue. In other words, the maggots had acted as parasites and eaten all dead tissue and all bacteria. The wound soon closed.

After mulling the situation over for eight years I concluded that if we could do that in war, by nature, we could do it experimentally in the laboratory. Therefore, in these two cases, both of which were chronic osteomyelitis of the femur for over a period of a year and a half, and you know how difficult it is to clear up some cases of osteomyelitis, I deliberately removed the granulation tissue in one case. We grew our maggots on a piece of rotten beef; that is, put house fly on the beef. The life of a maggot is seven days. Therefore, one did no toiling of the wound, but simply cleansed it out with water and removed the granulated tissue. Three days later, after all hemorrhage had ceased, one inserted the maggots directly into the wound itself, as much as the wound would hold. One left the wound entirely open and covered it with a cage so that the sunlight could go directly to it and so that the maggots could not escape.

The maggots were then changed every six days, because maggots become flies in seven days. At the end of six weeks, five weeks in one case and six weeks in the other, both of these two cases which had chronic osteomyelitis for one year and a half had entirely healed up.

I wish to put that on record as a preliminary report on the violable antiseptic now used.

PRE-ECLAMPTIC TOXEMIA*

By W. B. ANDERSON, M.D.,
Nashville, Tenn.

The pregnant woman is liable to a multitude of symptoms, occurring chiefly in the latter months of pregnancy, which are generally credited to endogenous poisoning. It has not been definitely proved that these symptoms are due to non-bacterial poison, as they have not been isolated or even identified.

They are supposed to be of toxemic origin because of a clinical similarity to symptoms produced by a known toxic poison, such as the venom of snakes.[1]

The inability of the pregnant woman to throw off this poison causes an accumulation of toxins, which we term toxemia of pregnancy, giving rise to such well known symptoms as albuminuria, high blood pressure, cellular degeneration of the liver and kidneys, edema and vascular changes, evidenced by subjective symptoms such as headache, visual disturbances, nausea, vomiting, general lassitude, and epigastric pain.

Toxemia of pregnancy is as old as medical literature, but it is frequently discussed under the title of its symptoms, such as albuminuria of pregnancy, edema of pregnancy, or eclampsia. When it is known definitely what toxemia of pregnancy is, it may have an altogether different title and toxemia may be a symptom.

There have been many theories as to the causation of toxemia of pregnancy. Among those of recent popularity are the placental theory of Young, the corpus luteum theory of Wallis and Williams, the intestinal toxemia theory of Tweedy, and others I will not mention for practical reasons. A good working theory is that toxemia of pregnancy is the result of a cleavage product of an abnormal protein digestion with a disturbance of carbohydrate metabolism.

All theories, to date, lack proof and are proven to be more or less erroneous. However, there are some facts to be borne in mind. Young women are more susceptible to toxemia, twenty-four years of age being the average. In the London statistics primigravidae exceeded multiparous pregnancies, in toxemia, in a ratio of seventy to thirty.[1] The significance of this statement will be realized when we remember that multiparous labors are about four times as common as primiparous.

Nine per cent of multiple pregnancies have toxemia. Hydramnios is common in toxemia and frequently symptoms show improvement when the membranes are ruptured and the amniotic fluid allowed to escape. Dietetic errors certainly add to the accumulation of toxins, even if they have no bearing on the causation. Fatigue and over-exertion will predispose to albuminuria by increasing the strain on the function of the kidney.

Yet a pre-existing nephritis will not predispose to eclampsia. Neither will eclampsia in one pregnancy predispose the patient to eclampsia in a future pregnancy, though it is probable that she will develop albuminuria due to a permanent renal degeneration, resulting from a previous eclamptic toxemia.[2] This fact was proven by a follow-up study of a series of cases at the Johns Hopkins Clinic. Sixty per cent or more of the eclamptic cases showed a nephritis

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upon their return several months later for examination. As one means of preventing toxemia, we are justified in advising against pregnancy a woman who has had eclampsia or a definite pre-eclamptic toxemia, until a thorough examination is made and renal damage is estimated. I should advise against pregnancy until all evidence of damage clears up. If there is found a far advanced nephritis and the woman is pregnant, I should advise an abortion.

Stander and Peckham[3] classify toxemia of pregnancy into five groups: eclampsia, pre-eclamptic toxemia, chronic nephritis complicating pregnancy, eclampsia with nephritis and low reserve kidney. This is well enough for a scientific differentiation. Yet an eclampsia cannot be differentiated from pre-eclampsia until the woman has a fit. And a chronic nephritis is not diagnosed until after the puerperium, even with the aid of blood chemistry and a complete urinalysis.[2] Of course edema, albuminuria and high blood pressure in the early months of pregnancy would strongly suggest nephritis. My paper is confined to pre-eclamptic toxemia, and in my effort to be practical, I am considering only two groups, true pre-eclamptic toxemia and toxemia with complicating nephritis. I believe every case of late toxemia of pregnancy will become eclamptic, or drift into coma, if not properly managed; depending, of course, on the amount of toxicity and on the resistance of the patient; that is, her forces of elimination, her reserve supply of glycogen and the length of time until her uterus is emptied.

Slemons[4] points out the danger of regarding all toxemias as due to a common etiological factor, or as representing a single pathological entity. I believe toxemia of pregnancy is due to a common etiological factor and that its different phases are due to the different types of patients, the difference in degree of toxicity and difference in resistance of its victims. There may be many complications of toxemia. The two most important are the liver and kidney deficiency.

Hynman[5] has been quoted as saying that the kidney of pregnancy manifests a degenerative process, while a true nephritis is of inflammatory origin. In either case, the immediate effect on the toxemia would be much the same, giving rise to symptoms so similar that differentiation is almost impossible. The urinary findings, albumin, casts, urea, daily output, and the symptoms, edema, visual disturbance and headache, are much the same in either case.

Edema, when present, is usually the earliest symptom noticed. But it must be borne in mind that a patient can have a fatal eclampsia, with no appreciable edema. Also a patient may approach to within a few hours of eclampsia without albuminuria. Hence, the saying: "Eclampsia came on like a clap of thunder from a clear sky." I would regard edema more as a symptom of nephritis than of toxemia and the blurring of vision is most probably due to edema of the macula. The blindness of eclampsia is different and probably due to hemorrhage of the retina.

Hepatic insufficiency is the most important complication of toxemia of pregnancy and is usually present; however, Queen Charlottes Hospital reports a case of normal liver from a woman who died of fulminating eclampsia. There are various theories to account for the liver involvement. Slemons' theory is that the fetus and placenta require large amounts of glycogen, which is secured from the liver, the storehouse of glycogen. If a patient is fed on a rich carbohydrate diet with limited proteids this demand is met. If not, the supply is exhausted and fatty degeneration of liver cells takes place. This theory has been further strengthened by the prompt relief gained by intravenous infusion of glucose.

I think the works of Titus, Dodds, Willetts[6] and Ernst Pribram[7] and others give conclusive proof that a hypoglycemia is the rule in advanced toxemia of pregnancy, whether it is the hyperemesis of the early months of pregnancy or pre-eclamptic, and that the disturbed metabolism is the result of a carbohydrate deficiency.

This theory furnishes us the safest principles upon which to fight toxemia of pregnancy. Practically all other complications and symptoms, such as affections of brain and nervous system, heart and lungs, vomiting, headache, and edema, are dependent upon the involvement of the liver and kidney. Therefore, to outline a treatment against toxemia in pregnant women, the function of these two organs must be borne in mind from the beginning.

There is no disease in which the clinical features are more varied or prognosis more difficult to formulate, and this should be explained to the patient upon the first consultation, which should be early in pregnancy. A close history should be taken of her general health, previous infectious diseases and convalescences. Record any edema or other trouble with a former pregnancy, examine for focal infection, make complete urinalysis and blood pressure record. This

may throw some light on a pre-existing nephritis. At least it forms a basis for comparison with future examinations. A persistent high blood pressure may mean nephritis, while a persistently rising blood pressure means toxemia. The patient should be made aware of all subjective symptoms and cautioned to report them upon their first appearance. She should be liberally fed, leaning decidedly toward a carbohydrate, salt poor diet. Cooperation is necessary. She should be made a party to the management. Keep up normal elimination throughout her pregnancy. Give laxatives when needed. Consultations should be monthly until the sixth month, then all things going well, her visits may be every two or three weeks. At any time should symptoms of toxemia appear she should be put to bed and a closer watch kept up. If the symptoms are not checked, or if they become more exaggerated, she should be put in a hospital for a more careful and correct record. Here the treatment depends on the condition of the patient as evidenced by subjective symptoms, urinary findings, amount of excreta, blood pressure, blood chemistry, and advancement of pregnancy. If she is within four weeks of maturity, both mother and baby stand a better chance with induced labor and termination of pregnancy.

If she is not so far advanced in pregnancy, cut down the diet to orange juice with corn syrup, toast, jelly and plenty of fluids. If this is not tolerated by the stomach, give glucose intravenously, 20 c. c. of a 50 per cent solution of 300 c. c. of a 20 per cent solution, according to the amount of edema or evidence of dehydration, as the case may be.

I see no reason for giving insulin in a hypoglycemia, and I think it has been proved that glucose will be properly utilized when put into the vein. Intravenous magnesium sulphate may be given to the eclamptic type, and it is a good laxative given by mouth in pre-eclamptic toxemia. Very recently much has been written about liver extract treatment. I know nothing about it. There is no specific remedy for toxemia. The best results are promised by the above mentioned treatment, along with other hospital routine. If in spite of this treatment there is a persistent advance of symptoms, I should terminate pregnancy. If you do not, you are sure to lose the baby and the chance of losing the mother increases with the advance of toxemia.

SUMMARY

In this country we are losing over 4000 women a year from toxemia of pregnancy.[8] Over 20,000 babies are born dead as a result of toxemia, one woman in every 200 pregnancies develops eclampsia, one in 600 dies of eclampsia, and infant mortality in eclampsia is 30 per cent. This can mostly be prevented, modified or arrested before eclampsia develops if a properly managed prenatal care is carried out. Liver and kidney degeneration is the result of, and not the cause of, toxemia. Though we do not know the etiology of toxemia, a theory upon which we can base some therapeutic action is better than an intangible theory. The safest principle upon which to base treatment is to limit proteids, give a liberal carbohydrate, salt-poor diet, plenty of liquids, and to see conservatively that there is elimination by kidneys, skin and bowel. In case of advanced nephritis, terminate pregnancy before the nephritis exterminates your patient.

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Doctors' Building.

DISCUSSION (*Abstract*)

Dr. Ivan Procter, Raleigh, N. C.—Every pregnant woman is a potential pre-eclamptic. In our experience this disease appears clinically in 10 per cent of all cases. The physician who will do the most good for these patients is the one who is ever on the watch for the first symptom and sign of the disease. This is usually a gradual or sudden rise of systolic blood pressure. We cannot wait for albumin or edema, both of which are unreliable, but we must detect this disease in its incipiency by recognizing the first reliable sign. In addition to a rise of blood pressure, a frequent forerunner of toxemia is increase in body weight. Any woman who gains more than twenty pounds during her pregnancy, seven pounds for the fetus, five pounds for the uterus and placenta, and eight pounds for her body, is gaining too much, and if we can keep her gain in weight within these limits we will rarely have edema, rarely have an oversized child, and frequently we will prevent toxemia.

I believe the treatment of pre-eclamptic toxemia can be summed up in the one word, "prevention," and that subdivided into absolute rest in bed, milk diet, and the termination of pregnancy. In a review of pre-eclamptic patients six weeks to six months post-partum, we found that 25 per cent of them showed albumin and had a systolic blood pressure of over 145. That is a smaller figure than the Hopkins report, but I think it is due to the early induction of labor in pre-eclamptic patients. Our rule is that if the symptoms and signs persist in spite of absolute rest in bed, milk diet and thorough elimination, pregnancy is to be terminated at once. A continuation of pregnancy under such circumstances does more damage to mother and baby than does the premature induction of labor.

Dr. R. W. White, Asheville, N. C.—Dr. Procter spoke of the gain in weight of the patient as twenty pounds. Suppose the patient weighs two hundred pounds to begin with. She is going to gain more than twenty pounds if she gains in the same ratio as the patient who weighs ninety pounds. In our experience we find that the mother may make a huge gain at five or six months, while all other symptoms are perfectly normal. At first it worried us, but it is such a constant phenomenon that we have learned to regard it as a normal occurrence.

Our percentage of pre-eclamptics in the mountains is about 5 per cent in a series of 1000 cases.

Dr. Anderson (closing).—A persistent rise in blood pressure is the most significant single symptom in toxemia of pregnancy. But there is no one symptom upon which you can rely.

An increase in weight, edema, headache, or albuminuria may be present in the absence of toxemia of pregnancy. You have to weigh all findings and then consider them collectively before a diagnosis can be made or a treatment outlined.

THE CORRELATION OF SURGERY, RADIUM AND DEEP X-RAY THERAPY IN THE TREATMENT OF MALIGNANCY*

By EDWARD T. NEWELL, B.S., M.D., F.A.C.S., Chattanooga, Tenn.

Speaking as a surgeon, I believe that many surgeons, through lack of knowledge, skepticism and looking only through "surgical eyes," utterly fail to appreciate the real value of radium and deep x-ray therapy in the treatment of malignant conditions. The important questions for consideration by the surgeon and radiologist are:

(1) What cases are best treated by surgery, alone?

(2) What cases are best treated by radium, alone?

(3) What cases are best treated by deep therapy, alone?

(4) What cases are best treated by a combination of surgery and radium?

(5) What cases are best treated by surgery and deep therapy?

(6) What cases are best treated by radium and deep therapy?

(7) What cases are best treated by surgery, radium and deep therapy?

It shall be my endeavor to answer the above questions by recounting a few cases that will illustrate the appropriate use of these therapeutic agents, and the treatment as carried out at our Clinic during the past ten years.

*Read in Section on Radiology, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

A few master surgeons in the "great hidden centers" with magical touch and dextrous strokes of the aseptic scalpel prefer surgery alone in the treatment of all malignant conditions. This is especially true with regard to the treatment of breast malignancy, cancer of the cervix and cancer of the body of the uterus.

It is also surprisingly true that some surgeons who on all occasions deprecate the value of radium and deep therapy before medical associations and other gatherings will use radium daily in their clinics and in their private work. You will hear these men say in summing up the treatment of any seemingly well advanced malignant condition, following the judicious use of the cautery, "This patient will be consigned to the Radiological Department for radium and deep therapy." If one is using radium alone or as an adjunct, and is obtaining satisfactory results, he should commend it. If you feel that radium and deep therapy will aid you in your well advanced and inoperable cancer cases, the time to avail yourself of these agents is immediately following the use of the cautery or knife. Give the patient a fair and full chance for recovery, and radiation fair and full recognition.

Should you delay the use of radium and deep therapy, as is frequently done, until the patient is moribund, you should not expect decided benefit from their use. Many surgeons will operate and re-operate for malignancy, but when the condition continues to return, they recommend radiation. The surgeon feels that radiation will improve the condition temporarily, will prolong the life of the patient, yet he has no faith that radiation will ultimately cure the patient, and rightfully so; for he has permitted surgery to monopolize the treatment of the case until the disease has advanced too far for radiation to be of real benefit.

This skepticism on the part of the surgeon, this lack of cooperation between the surgeon and radiologist, this lack of coordination of all the factors we possess to fight the ever-increasing cancer wave, is responsible for my feeble attempt to emphasize the great force that may be aligned against cancer provided surgery and radiation are properly combined.

That surgery, radium and deep therapy are not being used to the best advantage in combating cancer is due in part to lack of understanding of the value of radiation by the surgeon, as well as the lack of knowledge of the value of surgery by the radiologist, and may I say to intolerance?

Many surgeons feel that what cannot be done in the eradication of cancer by radical excision cannot be accomplished by any other means. The radiologist is often over-zealous in his belief and claims with regard to the value of radium or deep therapy, or both, in the treatment of malignancy.

I have known of many instances where malignant conditions were being treated with radium or deep therapy, or both, and where I felt sure the condition was a surgical one, or at least would have responded more readily to a combination of radiation and surgery.

Until the radiologist and surgeon obtain a broader view of the value of the various methods of attacking cancer they cannot expect a decided advance in the treatment of malignancy with the means that we now possess; nor can they expect a decided reduction in the death rate from cancer. I am not forgetful of the great good that is being done by the American Society for the Control of Cancer in educating the public with regard to the early recognition of cancer and of its effect in decreasing the mortality rate; but I am also hopeful of decreasing the mortality in the average malignant condition that the surgeon and radiologist see, by appropriate mass treatment.

It would be impossible in a brief discussion to detail all the malignant conditions that are amenable to surgery, radium and deep therapy; or to say definitely which agent alone or in combination is suitable or elective in the special condition present. I shall limit the discussion to skin cancer, cancer of the stomach, cancer of the uterus (cervix and body) and cancer of the breast, by far the most common sites of malignancy.

Cancers of the skin, epithelioma, squamous cell and basal cell carcinoma, if small without glandular involvement, are best treated by radium. When the lesion is large, deep seated, and especially where glandular involvement has developed, the complete and wide removal with the cautery, followed by the insertion of radium needles or emanations, with removal of glands; this followed by surface treatment with large doses of radium should be the method of choice. In suitable cases after the gland removal, radium can be buried (well screened) for a few hours with good effect.

In the old, well advanced skin cases, surgery alone is inadequate. Yet many surgeons rely wholly on excision. In such cases radiation alone is also inadequate; too much tissue is involved for complete radiation and destruction. If a nearly perfect removal is done with cautery or knife, then radiation will, in all probability, destroy the few remaining cancer cells.

Cancer of the stomach is a purely surgical condition, yet small benefit may occasionally be derived from post-operative deep therapy. In inoperable cancer of the stomach deep therapy in a few cases will ameliorate the symptoms and prolong life, but will not effect a cure.

Cancer of the cervix at the present time belongs in the radium and deep therapy column, whether early, border line or inoperable. A few early cases may yield as high a percentage of cures by pan-hysterectomy as by radium therapy, but the primarily mortality and hospitalization are factors to be reckoned with, and they mitigate against surgical treatment of all cases of cancer of the cervix. The treatment with radium needles is simple, safe and followed by little or no mortality and a higher per cent of cures than is obtained by any other means. At our Clinic in the last eight years we have not done a hysterectomy in any case of cancer of the cervix. We have several late cases, totally inoperable, with bleeding, foul odor, and cachexia that have passed the five-year limit for return, the result of radium and deep therapy treatment.

Cancer of the body of the uterus is best treated by pan-hysterectomy, provided the patient is a good operative risk. The operation should be followed by deep therapy treatments for two or three years. If the patient is a poor risk, the introduction of radium into the body of the uterus, well distributed, for three or four treatments, together with deep therapy from several ports of entry, will yield satisfactory results. I have two such cases, in which it is over five years since the initial treatment was given, and the patients are living and apparently relieved of the condition.

The treatment of cancer of the breast should be divided into the treatment of operable and inoperable cases.

The operable cases should have a radical Halstead done with the cautery or knife, preferably the former, and have two 25 milligram tubes of screened radium buried in the axilla at appropriate sites. The radium should be moved every eight hours and entirely withdrawn in twenty to twenty-four hours. As soon as the wound has completely healed deep therapy is given, and this is repeated every three months during the

first year, every four months during the second, and every six months during the third.

By this combination of complete removal with the cautery, implantation of radium and post-operative treatment with deep therapy, we have greatly increased our five-year cures in breast cancer. Especially is this noticeable in our well advanced breast malignancies. The other class of breast malignancies, hopelessly inoperable, is better treated with radium and deep therapy than with surgery or a combination of surgery and radium unless you use the cautery simply to remove the affected breast or growth and follow this with radium and deep therapy.

A few of these apparently hopeless cases, if the grade is low (two or three) occasionally remain well for five years or longer. Much depends on the proper application of the radium and the proper dosage in the deep therapy treatments. The average surgeon can no more properly apply radium in all cases than the average radiologist could do a Halstead breast amputation. The happiest results are obtained in the treatment of these grand malignancies where the surgeon is a radiologist or the radiologist is a surgeon or where the surgeon and radiologist are in the same clinic and work hand in hand. Too much emphasis cannot be placed on team work.

In the following case reports I have purposely omitted the reports of skin lesions, which are all too familiar to you.

Case 1.—L. S. V., age 54, was brought to the sanitarium on a stretcher. His abdomen was greatly distended and he was suffering from dyspnea. He had been operated upon three months previously at Vanderbilt Clinic by Dr. Haggard and seen by Dr. Charles Mayo. A diagnosis of inoperable carcinoma of the stomach was made and the abdomen was closed. The abdomen was tapped and easily palpable nodular masses were found in the region of the stomach. Patient was given deep therapy treatments over a period of two years. Six months after the first deep therapy treatment he returned to work on the farm. One year later he went back to his former occupation of running a street car. He finally succumbed to the malady, over two years after the first x-ray treatment. The x-rays of his stomach, taken when first seen and those after treatment had been given, showed a decided increase in the size of the stomach. This patient felt so well for a while that he insisted he was going to recover entirely.

Case 2.—Mrs. G. H., age 45, came into the Sanitarium in September, 1926, with a hopelessly inoperable squamous cell cancer of the cervix. Three radium applications, seven thousand milligrams hours, and four deep therapy treatments were given and followed by great improvement. The case was so far advanced that I had little hope of ultimate recovery, so decided to use Delpart's method. I opened the abdomen and implanted radium in special needles in each side of the uterus and broad ligaments, one thousand milligrams hours. It has now been two years since I first saw the patient and she is apparently well. She has gained thirty pounds and suffers no pain. She is doing her housework.

Case 3.—Mrs. S. M. K., age 50, was referred to the Sanitarium July 14, 1920, with inoperable cancer of the cervix (squamous cell). She had three radium applications of needles in the cervix and tubes in the uterus and deep therapy treatments over three years. Now, eight years since, the patient is well and doing housework.

Case 4.—Mrs. R. S. R., age 55, a native of Georgia, came to the Sanitarium September 13, 1923, complaining of hemorrhage from the uterus. Her periods had stopped five years previously, then a watery discharge began, followed by bleeding. Examination showed an enlarged uterus. The patient would bleed two to three weeks at a time, and had become very weak and anemic. She had myocardial degeneration and was a very bad risk. The pre-operative diagnosis was cancer of the body of the uterus. This was confirmed by the scrapings taken from the uterus, which showed adeno-carcinoma. On account of the serious condition of the patient a hysterectomy was not done. She received three treatments of radium and six treatments of deep therapy over a period of eighteen months. She was last seen in January, 1928. She had not had a hemorrhage in five years and had been doing her housework. She was complaining at that time of high blood pressure.

Case 5.—Mrs. A. R. S., age 58, came to the Sanitarium for gastric disturbance nineteen months ago. Left breast cancer was diagnosed by removal of a large nodule. It was a Grade 3 squamous cell carcinoma. There were no palpable glands in the axilla, but several were found when doing a radical breast removal with the cautery. Screened radium was buried and deep therapy given. There has been no return so far. The patient to all appearances is in perfect health. She comes for examination every ninety days.

Case 6.—Mrs. W. C., age 45, came to the Sanitarium in November, 1926, the left breast completely involved, and axillary glands palpable, with a medullary cancer, Grade 3. The patient refused radical operation. Complete breast removal with cautery was done, followed by spoke wheel insertion of radium needles. Radium pack was applied to the axilla and superclavicular region. The patient had three deep therapy treatments. It has now been two years and she apparently has no return. She will probably die of cancer before the five-year limit.

Case 7.—Mrs. H. L., age 43, came to the Sanitarium with a mass the size of an adult fist where the left breast had been removed nearly two years before. She had had three operations and two recurrences before seen by me. The mass was removed by the cautery and radium needles were implanted in spoke wheel fashion. The patient was given three radium treatments and five deep therapy treatments in the next three years. She lived three and a half years and died of breast metastasis, with Grade 4 adeno-carcinoma, post-operative.

Case 8.—Mrs. L. B. D., age 46, the wife of a dentist, came to the Sanitarium with well advanced carcinoma of the left breast with many glandular nodules in the

axilla, in 1921. A complete Halstead operation was done. This patient was given the largest amount of radium ever used in this Institution, buried in the axilla. She had a severe radium and x-ray reaction as a result of her radiation. The wound required six months to heal completely. She is perfectly well and has had no return. It is now over six years since the operation. We attribute the splendid results in this case to the unusually large dose of radium.

In conclusion, I should like to suggest that a committee composed of surgeons and radiologists be formed to investigate the relative values and merits of surgery and radiation in the various malignancies; that this committee, after due and mature consideration and investigation, formulate, as far as possible, standard treatments for the different malignant conditions that come to the radiologist and surgeon. Similar committees in other specialties have made investigations and recommendations that have been of incalculable value to the profession and to the public.

DISCUSSION (*Abstract*)

Dr. S. S. Marchbanks, Chattanooga, Tenn.—I am wondering whether it will ever be possible to radiate with deep therapy into an open area.

Dr. C. E. Samuel, New Orleans, La.—In the German clinics, the deep therapy application to the open area with just a thin protection to the outside has been attempted, but given up. It hasn't been made a method of choice.

Dr. D. Y. Keith, Louisville, Ky.—I have been closely associated with a surgeon, and I practise surgery with radiation therapy just as he practises radiation with his surgery.

We believe we benefit our patients by giving radiation before surgery, by x-ray, by implantation of radium needles or by gold or platinum implants into the tissue. In that way we use the malignant glands as filters to separate the needles at a very definite distance. Radium element can be withdrawn when the proper dosage has been given, and with gold or platinum implants the operative work can be done eight or ten days after implantation. You can still estimate doses and you do not leave a foreign body in the tissues. The advantage of treatment in this way is that you are dealing, as Dr. Mayo said several years ago, with a "sick cancer cell," if there is such an animal. In other words, a cancer cell that is operated upon or traumatized a week, ten days or two weeks after it has been radiated, should not transplant so easily into other traumatized tissue as it would if it had not been subjected to radiation. We feel that this is a definite advantage in the treatment of massive malignancy.

In the malignancies of the breast that were referred to, we have used this treatment with radiation before operation, using 50 or 25 mg. of radium in the axilla, occasionally as much as 150 mg. where it is placed above the clavicle in the axilla, and occasionally below the clavicle, depending entirely on where the primary tumor is. If the primary tumor is in the inner quadrant, the metastasis, if it goes in through the chest, will go through into the intermammary lymphatics along the internal mammary artery, and if you can place even 10 mg. radium needles at each interspace for three or four interspaces, you are getting a very definite advantage and probably will prolong the patient's life.

In most surgical clinics, where a surgeon is in charge, and not an operator, very few carcinomas of the cervix are operated upon at present. Practically all surgeons will gladly refer carcinoma of the cervix to the radiologist or to the gynecologist. The ones we have operated upon in the last few years have been few and where the diagnosis was in question. In these cases we always use a dose of radium in the cervix uteri before operation. Never use radium in the vaginal fornix, because if you wait long, a very difficult operation is made more difficult; but if radium is used in the cervical canal or in the uterine body or tissue that is going to be removed, the intensity of the radiation will not extend far enough out to interfere with operative procedures, and the tissues that you are going to sew into are just as flexible as if you had not used radium, provided the operation is done within twenty to thirty days after the first intracervical application of radium is given.

Dr. Newell (closing).—In regard to the discussion, may I say one word? I appreciate the discussion. I have derived benefit from it. What Dr. Marchbanks said has been attempted in Brussels. I have opened the abdomen and implanted radium needles in the uterus in two cases of totally inoperable carcinoma. I have one living and one dead. One is a patient who gained thirty pounds and has lived over two years since the application. The other case lived eight months.

I appreciate Dr. Keith's remarks in regard to radiation before operation. This should be done, but we can't always keep our patients over for operation. You give them treatment and they will improve or feel better and secure, then you may never see them again. In attempting to offset the pre-operative treatment I use the cautery in such cases, so there will be no implantation of cancer cells at the time of the operation.

I do trust that this Section and the Section on Surgery will appoint a joint committee composed of four or five men from each Section and have them discuss freely the cancer problem and formulate definite plans of attacking malignancy, so that those surgeons that are not availing themselves of radiation, and that should do so, will use it; and so the radiologist will recognize just what the surgeons can do for malignant conditions.

Only in this way can we surgeons and radiologists decrease the present cancer mortality.

TREATMENT AND MANAGEMENT OF FRACTURES OF HIP IN OLD PEOPLE*†

By LAWSON THORNTON, M.D.,
Atlanta, Ga.

Fracture of the hip in the aged is a most distressing accident. Usually the patient is senile and of low vitality. In days gone by I regarded the management of these old people as a medical problem, and believed they would die if they were treated by fixation in plaster casts. At the present time I look upon the plaster cast as a means of saving their lives.

As in all things surgical and medical, one should employ the procedures which, from his own experience, he has learned to carry out best, and which give him the optimum results.

The same end may be arrived at by different approaches. The details of the procedure we prefer are given here with the hope that they may be of service to others.

Usually these old people are first seen at their homes. It becomes a question of choice and expediency as to whether the patient be carried to a hospital or not. It is often quite an ordeal for an old person to leave home. If the patient insists upon staying at home we go about the problem in the following manner:

An x-ray picture is gotten with a portable machine to determine the exact nature and location of the fracture. A hospital bed, fracture boards to go under the mattress, Hawley spica table, plaster bandages and other supplies are taken to the home in a small truck. Everything except the patient's bed is taken from the room. The floor is protected with a covering of paper. The spica table and supplies are arranged.

The patient is given 1/6 to 1/3 grain of pantapon. Anesthesia is rarely ever necessary. If the patient is lifted intelligently by two who are well trained in lifting, little pain results. The one who lifts the lower half of the patient has the responsible part to play. He places one hand under the sacrum. The calves of the legs lie upon his other hand and forearm. The patient is lifted as if she were lying in bed, without any bending of the spine or hips.

After being placed upon the spica table, the one who is responsible for the setting holds the fractured extremity. By gentle, gradual movement the desired position may be obtained. If it is a fracture of the femoral neck, the position is that of internal rotation and abduction, as described by Dr. Whitman.

The trochanteric fractures require different angles of abduction and rotation, plus traction. We prefer a double spica cast, fixing the normal extremity parallel with the midline of the body. The spica extends from a point below the costal margin to the toes of both feet. A brace made of a plaster covered wooden bar spans the space above the ankles to complete the triangle and strengthen the cast.

In the meantime the hospital bed with ten or twelve-inch boards between the mattress and springs has replaced the patient's own bed. When the plaster has set, the patient is carefully lifted to a stretcher or to the bed and rolled over on her face and abdomen so that the plaster may be cut away over the bony sacral prominences, and stockinet pinned or tacked over the cut plaster edges. One cannot be too careful about this detail, as its neglect may result in a pressure sore.

For the sake of clearness it may be well to explain some details of this procedure.

A double spica cast is applied because (1) it gives better immobilization; (2) it permits easy change in position on one side, face and back; (3) it fixes the pelvis and makes it possible to leave the chest free; (4) the buttock and thighs support the weight and relieve much pressure on the lower back. There is no lower edge of the cast to give trouble as in a single spica.

The good leg is set up parallel with the midline of the body so that the patient may lie on that side to make turning easier.

Boards under the mattress are necessary to prevent sagging and the resulting pressure on the abdomen and costal margin by the upper margin of the cast.

The cast, of course, is most carefully padded with stockinet, felt and sheet wadding.

The position of the patient should be changed at regular intervals of four to six hours. After the cast is applied nursing becomes, above every-

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*Read in Section on Bone and Joint Surgery, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

†Illustrated with motion pictures.

thing else, the most important thing. Two twelve-hour duty nurses are essential to success.

In this day of good roads and facilities for transportation of the sick, little inconvenience is experienced by being taken to a hospital, even over quite long distances. The hospital is, of course, more convenient for the treatment of any condition. The expense may be made more, or much less, there than at home. The hospital nurses can, when necessary, take the place of the two special nurses.

At the end of ten weeks the cast is bivalved and the patient is carefully lifted out of the posterior shell.

If it is learned by x-ray and manual examination that the fracture has united, the patient is gradually given the freedom of the bed.

The knees are usually painful and stiff, and should have local heat and gentle massage to help restoration of motion. About four weeks more in bed are required and then the patient may be gotten up in a chair, later beginning gradually to walk with crutches.

DISCUSSION (*Abstract*)

Dr. H. Earle Conwell, Fairfield, Ala.—In our feeble and apparently impossible attempt to standardize the treatment of fractures, it seems to me that Whitman's abduction method for fractures of the neck of the femur comes nearer to a standardization than any other method. This is not a panacea by any means in every case of fractured neck of the femur. Good results are not obtained in every case, and in certain cases regardless of position of fragments and type of treatment, non-union and poor results are frequently seen.

Other methods have given excellent results, and should be used in certain cases.

Selection of the type of treatment to be used comes down (as in all other fractures) to (a) type of the fracture; (b) patient's age; (c) temperament; (d) economic status, that is ability to receive hospital treatment or necessity of home treatment; (e) efficiency of the treatment; (f) surgeon's experience and judgment and last but not least the ability of the physician or surgeon to carry out that certain treatment.

Dr. Thornton is to be congratulated on his presentation of this subject and his ideas and suggestions regarding the application of the plaster dressing to the knee on the uninvolved thigh. I have used this type of plaster dressing on a number of occasions to advantage.

Dr. Thomas P. Goodwyn, Atlanta, Ga.—I agree with Dr. Thornton that fractures of the neck of the femur in elderly patients can be handled in plaster spicas in a majority of cases. On several occasions I have used the method which he has outlined to you. It permits the patient to be turned on the uninjured side or face as often as necessary to prevent the formation of pressure sores on the back, as well as to eliminate the greater part of the danger from hypostatic pneumonia.

In the last two or three years I have endeavored to replace the straight spica with a spica with flexion at the hip and knee. The patient is anesthetized and placed on the fracture table. The fragments are reduced by the Whitman method of extreme abduction and internal rotation. When the reduction is secured it is checked by the x-ray examination. This is done by moving the fracture table along side of the x-ray machine or preferably by the use of a portable x-ray. If the position is satisfactory, we decide whether artificially to impact the fragments before attempting to flex the hip. If it is thought advisable and the patient's condition will permit, the Cotton method of impaction is carried out.

The thigh is flexed on the body to ninety degrees and the knee to the same amount, still keeping up some internal rotation. The plaster spica is applied from the nipples to the toes on one side or in many cases on both sides. If both legs are included, the well limb is placed in the same flexion as the injured side, without internal rotation. After the cast sets the position is checked by the x-ray.

The advantage of the flexed position is that it has allowed us to get some patients out of bed the day after the injury, even patients of above eighty years of age.

If we put the patient up in a rolling chair, the general health and the patient's morale are improved, hypostatic pneumonia is avoided, less nursing and a shorter stay in the hospital are required.

Dr. Albertus Cotton, Baltimore, Md.—I should like to ask Dr. Thornton in what proportion of his cases he obtains bone union by the Whitman method. I have been using this method for many years and think it is the best for routine use, although I do not get 100 per cent bony union. I believe the fibrous unions which I have sometimes obtained are due to disturbance of circulation of the neck of the femur and not to the method.

I think it is a mistake to break up an impaction unless there is definite adduction deformity. It is most important to determine by antero posterior stereoscopic x-ray films whether or not we are dealing with impaction or over-riding of the fragments. Those with over-riding should always be manipulated and the fracture reduced by the Whitman method. Impaction without deformity, in my opinion, should not be manipulated.

I had one experience in which an impaction was broken up because of a very slight deformity and the limb put in a plaster cast by the Whitman method. Stereoscopic x-ray after reduction showed ideal reduction. Upon removal of the cast ten weeks after reduction it was found that the patient had a fibrous union. Since that time I have obtained good results in several cases of impacted fractures which have been treated by simple immobilization without manipulation.

Dr. J. Knox Simpson, Jacksonville, Fla.—Dr. Whitman's work has made us quite critical of our results and has shown us the possibilities of repair in these old people, if his general principles of treatment are followed.

Dr. Robt. F. Patterson, Knoxville, Tenn.—I have had occasion in the last two years to treat three sisters, all of whom had fractures of the neck of the left femur. They were all sub-capital and looked alike.

Having been in intimate contact with Dr. Whitman's work at the Hospital for the Ruptured and Crippled for a considerable period I saw results in these cases that make me partial to the abduction treatment. No doubt the method of applying the cast to both legs is efficient, but I have, so far, found it unnecessary. The smaller the area covered by the cast the better. One detail Dr. Whitman insists upon is extension somewhat beyond a straight line. The purpose of this is to force the fragments against the anterior capsule and thereby to secure proper alignment.

It is possible to get too much abduction. A very slight hyper-abduction may force the neck downward to the cotyloid notch.

Dr. J. Albert Key, St. Louis, Mo.—I had a fracture of the femur in an old lady not long ago, and so far as I could tell and so far as any one else could tell that femur was firmly impacted. There was some deformity. I put her in a plaster cast without breaking up the impaction and she developed non-union. I should like to know whether others have had that unfortunate and embarrassing experience with an impacted fracture of the neck of the femur.

Dr. O. L. Miller, Gastonia, N. C.—Many men in general practice feel that it is a great risk to put old people with fractured hips into plaster casts. The physiological rest these patients get during their convalescence, when they are properly nursed, is usually the first good rest they have had in twenty-five years. I like to use that as an argument in favor of this method of treatment when it is thought to be rather radical. So far it is the best method we have of treating fractures of the hip in the elderly. One hundred per cent union need not be expected from any method.

TAR AND QUARTZ LIGHT THERAPY*

By J. Richard Allison, M.D.,
Columbia, S. C.

During the past two years I have been experimenting with coal tar in combination with quartz light in the treatment of certain dermatoses. Since the introduction of the colorless distillate of tar the treatment is less objectionable and has been used more extensively than heretofore. The use of these two agents at the same time, with the idea that they enhance each other in the treatment of dermatosis, is, I believe, a new one.

The air-cooled light is used because the rays are more penetrating. Even these rays are very superficial and are probably absorbed by even a thin coat of any ointment. I have no explanation for the efficacy of the treatment other than to suggest a photo-sensitive or chemical reaction set up by the action of the rays on the coal tar.

The technic consists of rubbing a thin coat of taroxide or taralba over the surface to be treated, and then exposing it to quartz light fifteen to twenty minutes. After three or four such treatments on successive days you will find the skin will tolerate ten to fifteen minutes' exposure without the ointment. This rapidly increased tolerance of the skin to quartz light in the presence of tar is of value. It usually requires eight to ten days with quartz light alone to attain a tolerance of ten to fifteen minutes.

I believe this combination treatment will cure many skin diseases that neither tar nor quartz light alone will cure; further, that the use of tar ointment with quartz light increases markedly the tolerance of the skin to the quartz light.

*Read in Therapeutic Session, Section on Dermatology and Syphilology, Southern Medical Association, Twenty-Second Annual Meeting, Asheville, North Carolina, November 12-15, 1928.

DISCUSSION (*Abstract*)

Dr. Jack W. Jones, Atlanta, Ga.—I remember reading the paper Dr. Willmott refers to and was perhaps rather enthusiastic about quartz light therapy at that time. I am sorry to say that I have lost much of my enthusiasm. I have never had any experience in using the combination treatments Dr. Allison proposes of quartz light and tar. I have found tar to be a very useful drug and since it has been purified it has a distinct value. I have used it for quite a number of things.

Where I have used quartz light, in the acute conditions of which Dr. Allison spoke, the light has rather seemed to irritate the condition than to help it. My idea would be that the tar was probably relieving the acute condition rather than the effect of the light. Just what action his combination of the two remedies effects, I do not think Dr. Allison attempts to explain.

Dr. Isaac R. Pels, Baltimore, Md.—I should like to bring to your attention a preparation of tar which some of us in Baltimore use and which is not advertised, but which has all the advantages we look for in tar, except that it stains and is dark. The credit for popularizing this in Baltimore should be given to Dr. J. W. Lord. It is rather innocuous; one does not experience a disagreeable odor; there is no irritation from it, and one can employ it in all conditions, almost promiscuously. It can be spread upon acute eruptions even where there is actual ulceration, and also over large surfaces. In my experience there has never occurred any absorption or any irritation locally. It may be exhibited in ointments or in liniments, but it is not miscible with water. The pharmacology is still to be worked out. Unfortunately it is more or less a proprietary remedy and is marked as oil of cadeberry (Muth Brothers' special). It is a distillation of juniper and contains other unknown ingredients. I recommend it as a very valuable agent from my own personal experience.

ARTIFICIAL PNEUMOTHORAX*†

By G. O. HAYNES, M.D.,
Oteen, N. C.

The subject of pneumothorax is of interest to everyone dealing with tuberculosis work. I will not dwell upon the indications for this procedure, for many of you are much more experienced than I. In the usual manifestations we have one notable exception here, which is that the men receive treatment without cost, and that the majority of them are given compensation sufficient to maintain their families. Of the patients in whom it appears that pneumothorax treatment will be necessary, more heal upon bed rest than are finally subjected to this treatment.

Among the contraindications for pneumothorax seem to be definitely diabetes and nephritis. Tuberculosis of the intestines is not, in our opinion; for if the patient is suitable for pneumothorax he will have a better chance to overcome the infection and there will be no bad results. Ulcerative tuberculous laryngitis has been of great interest to us, and we have had excellent results with these patients.

About 40 per cent of the patients with pneumothorax develop fluid. Our rule is to remove the fluid only when there is a definite indication. Some patients come in with purulent pleurisy, but we have been very fortunate in our treatment and so far not a single one of our patients has developed a purulent pleurisy. Complications such as embolism we have not encountered.

We have about 575 to 600 patients, and of these usually from 40 to 60 are receiving pneumothorax therapy. Considering the fact that the majority of our cases are far advanced, this is a little under the usual percentage. Some of our patients are transients, and, as I said, many of those suitable for this treatment get well upon bed rest.

I wish to show x-ray films that will bring out some of the points regarding pneumothorax. The patients with enormous cavities are always a problem, and with some trepidation we approach pneumothorax.

(Film)—This patient was admitted in September, 1927, with a history dating back three years, but with never very good treatment. You can see that the cavity wall is very thick. He was started on pneumothorax therapy shortly after this film was made and the cavity was reduced immediately in size, as more collapse of the lung was obtained, until in June, 1928, there was no evidence of a cavity. Two months later he was normal so far as temperature, pulse and sputum were concerned. He is now continuing the pneumothorax therapy as an out-patient.

(Film)—This man gave a history of onset of the disease about five years before his admission here in December, 1927. He had received one year's treatment previously and pneumothorax had been suggested, but he had never consented to take it. You can see the heavy band which represents the enormous cavity. There was some involvement in the other lung, the sputum was positive for tubercle bacilli, the temperature ranged from 37 to 38° C., and he was markedly under-weight. We recommended pneumothorax, but he was not willing to accept it until March, 1928. You can see in the successive films that with the collapse of the lung the cavity has become smaller and smaller, until it has almost disappeared. Within two months this man's temperature and pulse was normal; his weight is now above normal, and while the sputum is still positive, the expectoration is markedly decreased and the patient thinks he is well.

(Films)—This patient was admitted in 1922, and was on rather indifferent treatment up to 1925. At that time there was considerable involvement, with cavities on both sides. There were rales throughout the opposite lung at the time of admission, and he still has rales throughout. In 1925 he was put upon bed rest. In 1926 the films showed considerable improvement, but he did not get well. You can see that there is still a considerable cavity in one lung, and some involvement in the other. We started this patient on pneumothorax in October, 1927, and we obtained quite good collapse. There is an enormous number of adhesions, but slowly these have stretched and without pneumolysis the lung has collapsed. The patient is now the picture of health, with normal temperature and negative sputum.

(Films)—This patient is a female, who was admitted in September, 1925, with a history of onset in 1922. Various diagnoses had been made, but on admission she had positive sputum. There is a definite basal lesion, but not until we started pneumothorax, in May, 1926, could we see that there was a cavity in the lesion. This case was somewhat difficult to collapse. It was not possible to get an air bubble over the base, but she received the air in the second interspace anteriorly. We should naturally expect the formation of fluid in such a case and this occurred, but aside from the removal of the fluid she has had good results. The sputum became negative about two months after we started the pneumothorax therapy. She is in good health and we are allowing the lung to re-expand. She will probably have a continuation of the pneumothorax, because the lung will probably not re-expand well.

(Films)—This patient was admitted on September 6, 1927, with a temperature of 39 to 40° C., and a high pulse. He was extremely weak and had an extensive ulcerative laryngitis. You can see the enormous semicircular cavity. We advised pneumothorax and this was started in the same month. He was very ill and it was two months before his temperature began to subside. Not much air could be given and until the fluid

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formed we obtained no results, but the fluid gradually increased and about April 16, 1928, his temperature and pulse became normal. The sputum became negative, the ulcerative laryngitis healed and he was feeling well, so we felt that it was safe to remove the fluid. There has been some re-formation of the fluid, but he is the picture of health and is now coming in as a pneumothorax out-patient case.

We believe that when the patient is started on pneumothorax better results are obtained if we keep him on bed rest. We do not like him to leave until at least a year after the pneumothorax is started.

(Films)—This is a pneumonic type of lesion and we usually have some difficulty with these. This case was complicated by tuberculosis of the intestines, which has improved. His lesion on admission in August, 1927, as you can see, showed physical signs of consolidation, but later this represented a cavity. The physical findings and the x-ray findings were practically unilateral. His sputum was positive for tubercle bacilli and he was under-weight. We recommended pneumothorax and you can see that we obtained some fluid formation. We did not find it necessary to remove the fluid, for it absorbed. He now has no local pulmonary symptoms and very few clinical symptoms, except once in a while when he has a gastro-intestinal upset. He is in bed and is receiving radio-therapy and ultra-violet light to control the intestinal condition, which is definitely improving.

(Films)—This patient worked until about twenty days prior to his entrance, when he was taken with what was called grippe, but it did not clear up. His temperature was 38 to 39° C., the pulse was moderately high, and he was an extremely sick man. We watched him for a month and you can see the change in the lung. We recommended pneumothorax and he was willing to have it. We started the treatment and you can see the collapse that has been obtained, but it was slow. From January 17 to March 6 we did not get much collapse, but as time went on he developed fluid. He now has negative sputum and has had for three months. His temperature and pulse are normal, he is over-weight and feels good. The fluid removed for examination was negative for organisms and showed no pus cells.

The next series of films represents quite a number of things in regard to pneumothorax therapy.

(Films)—This man came to us in August, 1927. The x-ray findings were largely unilateral. He was quite toxic; had ulcerative laryngitis; fistula in ano; marked gastro-intestinal symptoms, and it was a question whether he had intestinal tuberculosis. He was kept under observation, but did not make appreciable improvement, and in October, 1927, the cavity had become larger. Pneumothorax was recommended, and you see here the result a month later. We went ahead with the treatment and in December, 1927, we were getting fair collapse of the cavity, but by that time by x-ray signs and clinically he showed a little extension into the other lung. When that occurs we try to keep the collapse steady, and in most instances the other lung has cleared up nicely. You can see that the collapse is good. The ulcerative laryngitis is pronounced healed, the fistula in ano has been operated upon, and the man is doing very well.

Question.—What is your exact technic?

Dr. Haynes.—The technic is individualized. With the ordinary patient on the first injection we usually give about 400 c. c. of air the first day. On the second day we give 400 to 500 c. c., skip a day, and then give another 400 or 500 c. c., making a skiagram after each injection. Then we increase the intervals to one week or less until collapse is obtained, after which it is always individualized. These were all unusual cases. The last patient I mentioned was kind enough to come over for you to see. He is a physician and you can see how well he looks.

Question.—What is your experience with pleural shock and pleural eclampsia?

Dr. Haynes.—We have not had those complications, and we do not wish to have them.

Question.—How long do you keep them in collapse?

Dr. Haynes.—At the beginning we tell the patient a minimum of two years will be required, usually three years, and many of them will have to be collapsed for life. That is about as definite as we can be.

We have, of course, had failures and in some instances have been able to get only a partial collapse. We fail in probably one-third of the cases to get a complete collapse, but if we maintain the partial collapse for three to six months we feel that we can advise thoracoplasty and that it will be less of a shock and will have better results than if the preliminary pneumothorax had not been carried out.

COEXISTING DIABETES AND PRIMARY ANEMIA*

By OSCAR BERGHAUSEN, B.A., M.D.,
Cincinnati, Ohio.

Hitzrot[1] has recently reviewed the literature of this subject and finds only six case reports in which the individual was considered to have both diabetes millitus and primary anemia. To these he adds the report of a seventh case. He concludes that there is no primary relationship between the two diseases and states that in his opinion the cases so far considered should be considered as coincidences. The following case report would tend to support his findings, since the patient was known to have had diabetes mellitus many years before the onset of the primary anemia which caused her death.

CASE REPORT

A. K., a white, single woman, aged 70, had been a nurse for more than forty years. She had come to this country more than forty years before from Germany and was one of the first trained nurses to practise in this city. She had always been very heavy, weighing more than 200 pounds, and was usually in good health. In 1913 sugar was found in the urine. Under dietary precautions the glycosuria disappeared, but she was not so strict in her diet thereafter. Sugar

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appeared in the urine from time to time, sometimes as much as 5 per cent.

Until the summer of 1928 the patient was able to get about and suffered no symptoms. While spending her vacation in Michigan she suddenly began to feel weaker, suffered an attack of vertigo and gradually found it more difficult to get about. She complained of numbness in the finger tips, was unsteady in her gait and dragged her right foot. Upon her return to this city she consulted a physician who told her that he was unable to help her. The writer did not see her until Nov. 13, 1928, when he examined her at a private hospital and found that she was bed-ridden, suffering from ataxia, numbness of the extremities, absent knee jerks and impaired sensation. Dr. Louis A. Lurie had seen her the day before and stated that his neurological findings were those characteristic of cord change in pernicious anemia. An oculist discovered cataractous changes two years before. The fasting blood sugar on Nov. 16, 1928, was 0.19 per cent, but no distinct reaction for sugar was obtained upon examining the urine. She was placed upon a diet restricted in carbohydrates and was given an increased amount of protein, including liver. Later the commercial liver extracts were added to the diet list. Her condition gradually became worse, there being no response to the administration of hydrochloric acid by mouth and the internal administration of Fowler's solution. She would not take the solution of gentian violet recommended by Caylor.[2] On Jan. 17, 1929, paralysis of the right side of the face developed. She was unable to speak. The patient became comatose and died Feb. 1, 1929. No autopsy was secured.

SPECIAL EXAMINATIONS

Blood Count.—Hemoglobin 65 per cent. Red cells 2,745,000. Color index 1.06. White cells 4,200. Differential: 63 per cent polymorphonuclears, 30 per cent small and 2 per cent large lymphocytes, 5 per cent eosinophils. Microcytes, macrocytes and a few poikilocytes present.

Blood Pressure.—126 systolic, 80 diastolic.

Blood Wassermann.—Negative reaction using cholesterinized and alcoholic antigens with the method of ice box fixation. The Kahn precipitin test was negative.

Blood Chemistry.—First blood sugar determination, 0.21 per cent. Fasting blood sugar, 0.19 per cent. Urea nitrogen, 25 mgs. per 100 c. c. Blood urea, 53.5 mgs. per 100 c. c.

Urinalysis.—(Mixed specimen) amber colored, clear, acid, specific gravity 1.025, sugar trace, albumen negative, diacetic acid negative, indican negative, urobilogen distinctly positive. Microscopic: no casts, no red cells, no pus cells.

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19 West Seventh Street.

PRECOCITY FROM HYPOPITUITARISM*

By LEWIS W. ELIAS, M.D.,
Asheville, N. C.

The two patients whom I shall show you are unusual, but not of great value so far as treatment is concerned.

Case 1.—The first patient, a white child, is 3 years and 9 months old, and lives in the neighborhood of Chimney Rock. As you can see, she is very large for her age.

Her father is 27 years of age, weighs approximately 125 pounds, and is in good condition. Her mother is 24 years old, weighs about 150 pounds, and also is in good condition. Another little girl, aged 17 months, is living and normal in all respects.

The maternal grandmother is living and well, aged 60, weight 160, height 5 feet, 5 inches. She has two sisters living and well, both normal in all respects. She has two brothers living; one is well and one has tuberculosis of the right arm. She has one distant cousin, female, who weighs 325 pounds, who does not know when the excessive weight began, but thinks it has existed all through her life. There is no history of cancer in the family.

The maternal grandfather is living and well, aged 49, weight 225 pounds, height 6 feet.

The child's paternal grandfather died at the age of 30, of "fever." Her paternal grandmother is living and well, aged 49, weight 115 pounds. He has one half-brother and two half-sisters living and well. There is no history of over-weight, tuberculosis or cancer in his family.

The parents of this child have been married for six years.

The child at birth weighed 6½ pounds; at nine months she weighed 45 pounds; at eleven months 55 pounds; at two years 85 pounds; at three years 108 pounds, and at present her weight is 114½ pounds. Her height is 3 feet, 11 inches. Her chest measures 35 inches, her waist 36 inches, her thigh 21 inches. The circumference of her head is 23 inches.

The pregnancy was normal, the delivery spontaneous, labor of average time, full term.

She was breast-fed until she was 11 months old, with supplementary feedings beginning at six months.

She has had none of the diseases of childhood, and has always been well, except for occasional colds during the last twelve or fourteen months. One year ago she had a head cold with infection of the right ear, which was opened and drained. Last August she began to have vaginal discharge, which has continued at intervals of from two weeks to two months. The discharge lasts one day only, at times is yellowish, purulent, and at other times is slightly pinkish. This usually comes on after a period of excitement. Her appetite

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and digestion are good and she eats everything that is offered. She usually has two bowel movements a day, but there is at times a tendency to "looseness" when she has three or four movements each day. She has good control of the bladder sphincter, which has existed since the age of two, and she only occasionally wets the bed. She empties the bladder four to six times daily.

She walked at the age of 18 months, and talked at the age of 2 years. She had six teeth at 6 months of age, and is said to have had most of the teeth at one year. The teeth are decaying badly now.

Wounds or abrasions of the skin heal rapidly. She stays outdoors and plays with other children normally, and is very active all the time, but her legs tire rather easily when she is on her feet for any length of time. She is inclined to be unruly at times, and we had great difficulty in getting her here today, as she did not wish to be exhibited.

We have been unable to make a Wassermann test because of her obstreperous nature.

We believe the condition is due to hypopituitarism.

Case 2.—This colored child's parents are dead and we have obtained a rather inadequate history from her aunt. She has the weight and height of a child of 13, although she is about 9 years old. She began to menstruate at the age of 2 years, and has menstruated regularly since every four weeks for about three days each time. She occasionally goes six weeks. When she has a cold she sometimes menstruates like a woman having a miscarriage, but otherwise the periods are of normal character. She occasionally has headache preceding the menstruation. She is backward mentally, but has been going to school for a year and remembers things a little. She is rather placid. There is a heavy growth of axillary and pubic hair, which came on at about two years of age and has increased since. Otherwise, she is just a backward child, with great over-growth of the breast.

Her aunt states that no matter how often she is bathed and powdered if she exercises at all she has an intensely disagreeable odor, and if she attempts to whip her for any reason the odor becomes so bad that she has to stop.

The family history is of no particular consequence. There were eight children by her father's second marriage, of which this child is one, and there were two by the first marriage, all normal, healthy children. There is no history of any precocious menstruation in any of the family connection, so far as the aunt is aware. It has been impossible to do any laboratory work in this case.

We do not know whether it is just a straight case of precocity, or some disturbance of internal secretion. She apparently has no abnormal sexual tendencies, and the clitoris is not enlarged.

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EDITORIAL DEPARTMENT

SOUTHERN MEDICAL ASSOCIATION
Twenty-Third Annual Meeting
Miami, Florida, November 20-22, 1929
Pre-Meeting Clinics, November 19, 1929

THE MIAMI MEETING

The Association has held many splendid meetings in times past in various cities, where hospitality was at its best and where convention facilities were all that could be desired. But it is doubtful that any place has yet been selected that can compare with Miami in the unique beauty of its setting and in the contrast which it offers to most of the rest of the Association's territory. "No one has seen the United States until he has seen Florida; and no one has seen Florida until he has seen Miami," is a very descriptive slogan. It is characteristic of Miami that those who have visited it wish to do so again.

In November, when Miami is at its best, to turn from the cool, often damp, fall days in Maryland, West Virginia, Oklahoma, Missouri, Alabama and Georgia, or even northern Florida, to a superb subtropical beach with surf bathing and good fishing, as well as a good spirited gathering of wide awake Southern physicians, stimulated by a carefully prepared, scientific program, is a temptation which few will find it easy to resist.

A sunning in Miami, just before the winter begins back home, will mean greater vigor for the work of the cold months.

In view of the unusual attractiveness of the meeting place this year, and its proximity to Cuba and Nassau by regular boat and airplane schedules, many men are either postponing their summer vacations till fall, or are planning a short rest in the summer because of a real vacation in Miami a little later.

The profession of Miami has determined that no previous convention shall excel in convenience, comfort and general service those offered by this garden spot of Florida. Nature has done its part and man has builded so well that within a radius of two blocks may be found fifteen thousand hotel beds. Surely no one need feel that his choice of location and price will be limited.

As to the cost of the trip, it must be remembered that those in attendance at the Southern Medical Association meetings no longer are required to validate tickets. The good average attendance of years' duration has assured the railroads of a sizeable attendance, so that now an unconditional one and a half fare round trip rate is offered to all. Special rates for side trips with touring parties to Havana or Nassau are offered at surprisingly low rates. The Miami trip, therefore, need not be regarded as a luxury intended only for the wealthy. The traveling expenses will be materially reduced and the hotel accommodations in Miami can be obtained throughout the same scale of quality and price as that found in any other city of its size. Emphatically, Miami is not the exclusive playground of the rich man. The average Southern physician can afford to go and take along at least some of his family.

The scientific program has been concentrated to three days, plus a pre-convention clinic day. Exactly half the convention time is assigned to clinics. A highly practical clinical meeting is thus assured the busy physician who wishes to acquire in a short time much information, presented in an attractive form. The participants in the program have been, and are being, handpicked to assure their ability to carry a worthwhile message to America's second largest medical organization. The convention dates are November 19-22, but rather liberal allowances are made by railroads for more extended vacations.

STERILITY IN WOMEN

Man has always attacked the problem of childless marriage in different ages from different points of view, at first with witchcraft directed at the unfortunate wife who was invariably termed "barren" merely because the husband asserted his ability to perform the sexual act and

his possession of ample libido. John Hunter, James Marion Sims[1] and others were successful in inducing conception by artificial insemination which greatly stimulated the medical profession to study sterility. One out of every ten marriages now is said to be childless (Kisch).[2]

Sims' slitting of the posterior lip of the cervix uteri yielded various successes, but these results do not seem capable of duplication in the hands of others. Dilatation and curettage are still the empirical treatment usually resorted to after little or no preliminary study. Where pregnancy follows, it is presumably due to the dilatation of the cervical canal and not to the so-called "freshening up" of the uterine lining caused by the curette, which unquestionably in ill-chosen cases has produced an untold number of deaths and invalidism from resulting pelvic inflammatory disease.

In 1914, I. C. Rubin,[3] of New York City, did some work on the injection of the uterus and tubes of dogs with collargol, an organic silver salt. Cary[4] was first to employ gas injection of the uterus clinically to test the patency of the fallopian tubes. This constituted the dawn of a new era in the study of sterility in women and marks the turning point from the old, inexact methods to the new scientific tests. Thus the occlusion of the fallopian tubes, the most common of all causes of female sterility (35-40 per cent)[5] can be determined accurately without operation. Since then Rubin has been the outstanding contributor to the literature along these lines.

In 1925, Sidney Forsdike,[1] of London, first made hysterograms with lipiodol (a 40 per cent suspension of iodin in olive oil), a preparation which had previously been employed by Sichard,[1] of Paris, for localizing spinal cord tumors. Whereas gas inflation had answered the question whether or not the fallopian tubes were closed, lipiodol showed where the obstruction lay.

A vast amount of work has been done on the role of the diet[6 7] in sterility. This seems to a great extent a question of the vitamin content of the food. All the vitamins except water-soluble C (found in fresh fruits and vegetables, especially oranges and tomatoes) have been shown to exercise a specific influence upon reproduction. In rats a marked deficiency of fat-soluble A[8] (from cod liver oil, butter, egg yolk) results in sterility due to failure of implantation of the ovum. Without rather large quantities of water-soluble B[9] (from fresh fruits and vegetables and especially yeast) lactation is unsuccessful. When fat-soluble D[7] (the antirachitic vitamin found in cod liver oil, butter and egg yolk and in supposedly pure form in irradiated ergosterol) is deficient in the development period of life, a deformed pelvis frequently follows, rendering childbirth difficult or impossible through the natural channel. If fat-soluble E[10] (the fertility vitamin from wheat germ oil and lettuce) is deficient, resorption of the fetus occurs, or in the male, testicular degeneration may result. It should be stressed that for reproduction, a much larger quantity of vitamins is needed than for maintenance of the normal animal.

A few years ago all retrodisplacements of the uterus were considered the cause of gynecologic symptoms such as lower backache and pelvic discomfort. Later, it was found that the retrodisplacement had to be bound down or to accompany a relaxed vaginal outlet and prolapse to produce symptoms attributable to the backward position of the uterus. A good therapeutic test is the use of the Smith-Hodge pessary. If it holds the fundus up and the pain ceases, one concludes that the retroposition is the cause of the pelvic distress and backache. However, it has more recently been shown that a certain number of retrodisplacements are found with tubes impervious to tubal insufflation.[1] When such a fundus is brought forward, the tubes may show patency.

Lastly, among the more important developments in sterility studies, is the factor of a moderately lowered basal metabolic rate.[11] Out of 91 sterility cases 52, or 57 per cent, had slightly subnormal basal metabolic rates. On thyroid treatment 30 per cent of these deficient in thyroid secretion later became pregnant.

1. Forsdike, Sidney: Sterility in Women. New York: Wm. Wood and Co., 1928.
2. Kisch, E. H.: Sterilitat des Weibes (Vienna and Leipzig, 1895), p. 52. Quoted by Forsdike in 1.
3. Rubin, Isadore C.: Kelly's Gynecology, Chapter XI. Peruterine Tubal Insufflation in Sterility. New York and London: D. Appleton and Co., 1928.
4. Cary, quoted by Rubin in 3.
5. Wharton, Lawrence R.: Kelly's Gynecology, Chapter X, Sterility. New York and London: D. Appleton and Co., 1928.
6. Reynolds, E.; and Macomber, D.: Fertility and Sterility in Marriages. Philadelphia and London: W. B. Saunders Co., 1924.
7. McCollum, E. V.; and Simmonds, Nina: Newer Knowledge of Nutrition. New York: Macmillan Co., 1925.
8. Wolbach, S. B.; and Howe, P. R.: Tissue Changes Following Deprivation of Fat-Soluble Vitamin A. J. Exp. Med. 42:753, 1925.
9. Sure, Barnett: Dietary Requirements for Reproduction. J. Biol. Chem. 69:29, 1926. Ibid, p. 53. Ibid, 74:37, 1927. Ibid, 74:45, 1927. Ibid, 74:55, 1927.
10. Evans, H. M.; and Bishop, K. S.: Existence of a Hitherto Unknown Dietary Factor Essential for Reproduction. J.A.M.A. 81:889, 1923.
11. Litzenberg, J. C.; and Carey, J. B.: Relation of Basal Metabolism to Gestation. Am. Jour. Obst. and Gyn. 27:550, 1929.

To recapitulate, the modern advances in the study of infertility in the female are: the peruterine tubal insufflation; the salpingograms following lipiodol injections of the tubes; the necessity of an adequate vitamin content in the dietary; the recognition of the variable role of retrodisplacement of the uterus; and, lastly, the finding of a slightly lowered basal metabolism among many sterile women, which under treatment respond in a goodly proportion of cases.

Advances in the study of sterile marriages have progressed by leaps and bounds during the past ten years. Yet 25 per cent of "cures" is still considered a good record.[12] If the next decade can furnish a like amount of new information on sterility, the lap dog may become as extinct as the dinosaur.

MORE MEDICAL LIBRARIES

There are about two hundred medical libraries listed for the United States and, of course, various others in foreign lands. When one considers the vast dimensions of our country and the number of physicians, the inadequacy of our medical library facilities will be apparent. A surprisingly large number of doctors has access to no medical library whatever. To be sure, many of the profession maintain very good private libraries and subscribe for a creditable list of periodicals. But there is a vast difference between the limited scope of a meager list of journals in a private collection and that of a regular medical library with its reference works and its periodicals covering the specialties, the underlying sciences, and research.

It is commendable for a physician to have a good private library, but it should not draw him away from the larger and more complete collections of literature to be found in medical libraries. Rather, it should stimulate him to extend his knowledge. No man can work alone and progress. In medicine, as in all other sciences, one profits from the work of others. To perfect oneself, one reads medical publications, attends medical gatherings and listens to papers read, and browses through a good medical library. There is no satisfactory short cut or compromise in this. To practise medicine with credit to oneself and to the profession presupposes an up-to-date knowledge of what is being done in the field of medicine. This is not acquired through inspiration but through contact with others and through intelligently selected reading.

In line with this we may go further and say that having acquired some knowledge the physician should follow the time-honored custom of imparting what he knows to others. Personal contacts are too limited for this. Medical papers should be prepared when something worthwhile can be written. Working up a good paper produces a better doctor. It forces him to go deeply into his subject, to ask the why of things, to systematize ideas, and to crystallize knowledge.

Many physicians have found that their health was neglected from want of systematic outdoor exercise and recreation. To combat this they have a regular time on definite days for golf, tennis, handball, or trap shooting. It is also important to see to it that mental atrophy does not creep upon them in the same way. A regular time for reading medical literature is greatly to be desired and will be a good antidote for intellectual stagnation.

The next best thing to a great medical library is any sort of medical library. This is not so difficult to obtain as one would think. Each county medical society can maintain some sort of collection of medical books and periodicals, either as an adjunct to a general library or in a hospital reading room. Sometimes a young physician can be found to attend a small medical collection for a very nominal sum, while securing a start in practice. Most public libraries are glad to give space and care to a collection of medical books and periodicals. The facilities for some sort of medical library are not so generally lacking as the presence of some energetic physician to stir up interest and start the movement. If once begun the benefits will insure its perpetuation.

An incentive to use the library after it has been established, is the custom of opening the meeting of the county society with a ten-minute talk on one or more papers taken from current medical journals. By rotating the assignment, eventually the whole membership can be induced to review some new work in medical literature.

The JOURNAL will be glad to render any assistance in its power to those desiring to start a medical library. Inquirers should state the number of members in the medical society, the population of the principal town, whether it has a general library, or any nucleus for a medical collection, and approximately the amount of funds available each year for the work.

12. Hunner, G. L.; and Wharton, Lawrence R.: Sterility: A Study Based on a Series of 526 Patients. Sou. Med. Jour. 17:269, April, 1924.

Miami---Where We Meet

FLYING IN MIAMI*

Have you been up yet? Do you like flying? How did you feel at 5000 feet?

Miamians are forgetting to ask these questions nowadays, since flying and aviation have become an essential part of their daily life. Most Miamians have had the opportunity to fly; most of them feel that it will soon be essential to know how, because aviation is the particular thing which is expected of Miami, seat of the new industry in the South.

Any day, which means any flying day, if you look skyward, over Miami or Bay Biscayne, you can see a half dozen ships heading east, west, north and south: a Pan-American plane bound for Havana, another for Nassau, and perhaps a third bound for the remote corners of Central America, where the plane preceded the railroad train as the chief method of transportation.

Municipal Airport from the air. Air mail for North leaves from here.

And this is the picture of modern Miami. Thousands of winter visitors have had their first flight in Miami just as they take their first winter dip in the tepid Atlantic. It is the hub of air travel around the southern half of the peninsular state. A hop to Miami means a hop to Cuba.

It is difficult accurately to picture the strides that air travel has made in Miami. It would be hard to imagine that this branch of transportation, as in many parts of Europe, has rapidly developed in Florida to a stage approaching rail travel with daily passenger service to remote points, great passenger terminals, beautiful hangars and all the trappings of an up-to-date railway service.

Since the first international air mail plane lifted her nose toward the sky and headed for Panama the plane has ceased to become a novelty to be watched in awe and uncertainty. It is big business today, with planes equipped with every facility to comfort the passenger.

Scores of times in a week planes taxi up to the great passenger terminal of the Pan-American Airways, take aboard a dozen or more passengers in the morning, and then, with clock-like precision, whisk them off on the magic carpet to foreign countries miles away.

Always the lines are expanding, taking in greater territory in the vast southern continent; and by November, 1929, additional hundreds of miles will be added to the airways that sweep southward from Miami. They are a part of a great tie-up with some of America's greatest railroads.

But for the pleasure seeker, the airplane in Miami is a factor worthy of consideration. The strange little islands in the Bahama group are quickly accessible by plane. Bimini, a short forty miles, requires but a half hour's flight to reach a world as old as Miami is new. And Nassau, largest city in the Bahamas, is equally old and charming, a popular winter retreat for both British and Americans. Two hours' flight will carry one across the Atlantic 170 miles to the Isle of New Providence.

Among Miami's most interesting show places are the airports, the seaplane base and the Pan-American passenger terminal, the latter a hive

*By Chas. C. Canny, Publicity Department, City of Miami.

of activity and the most modern air station in America.

An incoming plane discharges its passengers into a spacious waiting room, beautifully decorated with comfortable chairs and lounges. While customs inspectors examine their luggage they are served tea. The station has two restaurants, telegraph and cable offices and its own weather observatory.

Although it is several miles from downtown Miami, luxurious limousines are at service to carry passengers to the downtown area and the hotels.

Officers 1928-29

The following is a complete roster of the officers of the Southern Medical Association for 1928-1929, and of associations meeting conjointly with the Southern Medical Association:

President—Dr. Thomas W. Moore, Huntington, West Va.

First Vice-President—Dr. Paul H. Ringer, Asheville, N. C.

Second Vice-President—Dr. Felix J. Underwood, Jackson, Miss.

Secretary-Manager—Mr. C. P. Loranz, Birmingham, Ala.

Editor of Journal—Dr. M. Y. Dabney, Birmingham, Ala.

Councilors—Dr. H. Marshall Taylor, Chairman, Jacksonville, Fla.; Dr. W. W. Harper, Selma, Ala.; Dr. Morgan Smith, Little Rock, Ark.; Dr. Wm. Gerry Morgan, Washington, D. C.; Dr. W. P. Harbin, Rome, Ga.; Dr. J. H. Blackburn, Bowling Green, Ky.; Dr. Homer Dupuy, New Orleans, La.; Dr. Sydney R. Miller, Baltimore, Md.; Dr. Inman W. Cooper, Meridian, Miss.; Dr. McKim Marriott, St. Louis, Mo.; Dr. F. Webb Griffith, Asheville, N. C.; Dr. Lea A. Riely, Oklahoma City, Okla.; Dr. Wm. Weston, Columbia, S. C.; Dr. Edward T. Newell, Chattanooga, Tenn.; Dr. H. Leslie Moore, Dallas, Tex.; Dr. Lawrence T. Royster, University, Va.; Dr. Walter E. Vest, Huntington, West Va.

Board of Trustees (all are ex-Presidents)—Dr. W. S. Leathers, Chairman, Nashville, Tenn.; Dr. W. W. Crawford, Hattiesburg, Miss.; Dr. Stewart R. Roberts, Atlanta, Ga.; Dr. C. C. Bass, New Orleans, La.; Dr. J. Shelton Horsley, Richmond, Va.; Dr. Wm. R. Bathurst, Little Rock, Ark.

Section on Medicine—Dr. Lee Rice, Chairman, San Antonio, Tex.; Dr. J. E. Knighton, Vice-Chairman, Shreveport, La.; Dr. V. P. Sydenstricker, Secretary, Augusta, Ga.

Section on Pediatrics—Dr. Eugene Rosamond, Chairman, Memphis, Tenn.; Dr. Hugh L. Dwyer, Vice-Chairman, Kansas City, Mo.; Dr. A. J. Waring, Secretary, Savannah, Ga.

Section on Gastro-Enterology—Dr. J. Russell Verbrycke, Jr., Chairman, Washington, D. C.; Dr. A. L. Levin, Secretary, New Orleans, La.

Section on Pathology—Dr. George S. Graham, Chairman, Birmingham, Ala.; Dr. Harry T. Marshall, Vice-Chairman, University, Va.; Dr. Ernest W. Goodpasture, Secretary, Nashville, Tenn.

Section on Neurology and Psychiatry—Dr. Lewis M. Gaines, Chairman, Atlanta, Ga.; Dr. R. Finley Gayle, Jr., Vice-Chairman, Richmond, Va.; Dr. Carrol C. Turner, Secretary, Memphis, Tenn.

Section on Radiology—Dr. J. M. Martin, Chairman, Dallas, Tex.; Dr. J. C. Dickinson, Vice-Chairman, Tampa, Fla.; Dr. J. W. Pierson, Secretary, Baltimore, Md.

Section on Dermatology and Syphilology—Dr. F. J. Eichenlaub, Chairman, Washington, D. C.; Dr. Thos. W. Murrell, Vice-Chairman, Richmond, Va.; Dr. J. C. Michael, Secretary, Houston, Tex.

Section on Surgery—Dr. Barney Brooks, Chairman, Nashville, Tenn.; Dr. J. Knox Simpson, Vice-Chairman, Jacksonville, Fla.; Dr. Charles A. Vance, Secretary, Lexington, Ky.

Section on Bone and Joint Surgery—Dr. J. S. Speed, Chairman, Memphis, Tenn.; Dr. George E. Bennett, Vice-Chairman, Baltimore, Md.; Dr. Oscar L. Miller, Secretary, Gastonia, N. C.

Section on Gynecology—Dr. Guy L. Hunner, Chairman, Baltimore, Md.; Dr. W. R. Cooke, Vice-Chairman, Galveston, Tex.; Dr. Thos. B. Sellers, Secretary, New Orleans, La.

Section on Obstetrics—Dr. James R. McCord, Chairman, Atlanta, Ga.; Dr. J. L. Andrews, Vice-Chairman, Memphis, Tenn.; Dr. W. R. Cooke, Secretary, Galveston, Tex.

Section on Urology—Dr. Raymond Thompson, Chairman, Charlotte, N. C.; Dr. Courtney W. Shropshire, Vice-Chairman, Birmingham, Ala.; Dr. E Clay Shaw, Secretary, Miami, Fla.

Section on Railway Surgery (Southern States Association of Railway Surgeons)—Dr. Frank H. Walke, Chairman, Shreveport, La.; Dr. Henry Middleton Michel, Vice-Chairman, Augusta, Ga.; Dr. J. W. Palmer, Secretary, Ailey, Georgia.

Section on Eye, Ear, Nose and Throat—Dr. Wm. Thornwall Davis, Chairman, Washington, D. C.; Dr. Frederick E. Hasty, Chairman-Elect, Nashville, Tenn.; Dr. Fletcher D. Woodward, Secretary, University, Va.

Section on Public Health—Dr. E. L. Bishop, Chairman, Nashville, Tenn.; Dr. M. A. Fort, Vice-Chairman, Bainbridge, Ga.; Dr. P. E. Blackerby, Secretary, Louisville, Ky.

National Malaria Committee (*Conference on Malaria*) (Meeting conjointly with Southern Medical Association)—Dr. L. O. Howard, Honorary Chairman, Washington, D. C.; Dr. William Krauss, Chairman, Twenty-Nine Palms, Calif.; Mr. J. A. LePrince, Vice-Chairman, Memphis, Tenn.; Dr. L. L. Williams, Jr., Secretary, Richmond, Va.

Section on Medical Education—Dr. J. H. Musser, Chairman, New Orleans, La.; Dr. Robert Wilson, Vice-Chairman, Charleston, S. C.; Dr. Kenneth M. Lynch, Secretary, Charleston, S. C.

Southern Association of Anesthetists (Meeting conjointly with Southern Medical Association)—Dr. A. C. Shamblin, President, Rome, Ga.; Dr. C. Wilmer Baker, First Vice-President, New Orleans, La.; Dr. H. B. Stewart, Second Vice-President, Tulsa, Okla; Dr. W. Hamilton Long, Secretary, Louisville, Ky.

The American Society of Tropical Medicine (Meeting conjointly with Southern Medical Association)—Dr. Wm. E. Deeks, President, New York, N. Y.; Dr. Kenneth M. Lynch, First Vice-President, Charleston, S. C.; Dr. Sidney K. Simon, Second Vice-President, New Orleans, La.; Dr. E. Peterson, Secretary-Treasurer, Washington, D. C.; Dr. Damaso de Rivas, Assistant Secretary, Philadelphia, Pa.

Women Physicians of Southern Medical Association—Dr. Louise M. Ingersoll, Chairman, Asheville, N. C.; Dr. Margery J. Lord, Vice-Chairman, Montreat, N. C.; Dr. Mary B. Baughman, Secretary-Treasurer, Richmond, Va.

Woman's Auxiliary of the Southern Medical Association—Mrs. C. W. Garrison, President, Little Rock, Ark.; Mrs. Jas. N. Brawner, President-Elect, Atlanta, Ga.; Mrs. A. Byron Holmes, First Vice-President, Fairmont, N. C.; Mrs. W. H. Nardin, Second Vice-President, Anderson, S. C.; Mrs. J. W. Sams, Recording Secretary, Crestwood, Ky.; Mrs. D. A. Rhinehart, Corresponding Secretary, Little Rock, Ark.; Mrs. Edward Clay Mitchell, Treasurer, Memphis, Tenn.; Mrs. Southgate Leigh, Parliamentarian, Norfolk, Va.

Book Reviews

Racial Hygiene. A Practical Discussion of Eugenics and Race Culture. By Thurman B. Rice, A.M., M.D., Associate Professor of Bacteriology and Public Health, Indiana University School of Medicine. 376 pages, illustrated. New York: The Macmillan Company, 1929. Cloth, $4.50.

The author has presented a subject for the educated lay reader and in the main the book can be recommended. As in most works on this subject, sections are given to the effect of alcohol on the human race and on this subject the author is an extremist.

The chapter devoted to selection in marriage is too brief to cover this subject. As an attempt to interest the educated class of society in race hygiene, the book is commendable.

Diabetes and Its Treatment. By Frederick M. Allen, M.D., Director of the Physiatric Institute, Morristown, New Jersey. 98 pages. New York: Funk & Wagnalls Company, 1928. Cloth, 30c.

Allen's pocket manual on diabetes, one of the National Health Series, though it sells for only thirty cents, is perhaps the most practical book available for the intelligent diabetic and his physician.

Pediatrics. Edited by Isaac A. Abt, M.D., Professor of Pediatrics, Northwestern University Medical School, with the collaboration of Arthur F. Abt, M.D., Assistant in Pediatrics, Northwestern University Medical School. A Volume of The Practical Medicine Series, comprising eight volumes on the year's progress in medicine and surgery. Series 1928. 441 pages. Chicago: The Year Book Publishers.

This volume presents an excellent brief survey of the literature for the year 1928. All phases of pediatrics are well covered, clinical as well as theoretical. Where controversies occur the editor inserts his opinion. The book is, unfortunately, marred by frequent typographical errors, occasionally obscuring the real meaning of the sentences. This is especially true where chemical formulae are incorrect. Despite this, it is a good resume of the pediatrics of 1928.

Angina Pectoris. By Harlow Brooks, M.D., Emeritus Professor of Clinical Medicine, New York University; Colonel, Medical Reserve, U. S. A. 164 pages. New York: Harper & Brothers, publishers, 1929. Cloth, $2.50.

The aspects of the symptom complex of angina pectoris, with its pathological physiology, symptomatology, diagnosis and treatment, are dealt with in this monograph in the thorough, painstaking manner characteristic of the experience of the eminent author.

The language is simple and direct, and the facts are so presented that the reader can grasp readily the principles underlying the management and the understanding of this important syndrome.

The various forms of treatment, both general and specific, are particularly stressed in this treatise. To the preventive side, the author devotes a chapter outstanding in its concrete and valuable suggestions. The work as a whole is so replete with wise counsel that it imbues the reader with sober optimism and it guides him to better avenues of prevention and treatment.

Tuberculosis and How to Combat It. By Francis M. Pottenger, A.M., M.D., LL.D., F.A.C.P., Monrovia, California. Second Edition. 275 pages. St. Louis: C. V. Mosby Company. Cloth, $2.00.

The book is a rather lengthy treatise on modern methods used in the treatments and so-called cure of tuberculosis. It is well written, but contains much superfluous material, and is rather overdrawn scientifically for the average tuberculous patients. Its scientific terminology could well be simplified into more common language.

The book, like many others written for the instruction of the tuberculous, serves a very useful purpose in the treatment of the disease, through obtaining the cooperation of the intelligent sick.

The Writing of Medical Papers. By Maud H. Mellish-Wilson, Editor of the Mayo Clinic Publications. Third Edition, Revised. 12 mo. of 184 pages. Philadelphia and London: W. B. Saunders Company, 1929. Cloth, $1.50.

Three editions in seven years bespeak more clearly than words that warm reception which this pocket-sized volume of 184 pages has received.

Medical men seem strangely lacking in their ability to put their thoughts into simple, grammatical, expressive English. By far the majority of them are in need of some sort of guide, and none can be more heartily recommended than this small book written by Mrs. Maud H. Mellish-Wilson. Few questions in the construction of a paper could arise which are not satisfactorily answered in this book. Its table of contents and its full index render reference to specific points of information easily available.

Southern Medical News

ALABAMA

Dr. Douglas L. Cannon, who has been Acting State Health Officer since the death of Dr. S. W. Welch, has been elected State Health Officer.

At the recent annual meeting of the Alabama State Medical Association the following officers were elected for the year: Dr. L. E. Broughton, Andalusia, President; Dr. K. A. Mayer, Lower Peachtree, Senior Vice-President; Dr. G. A. Cryer, Anniston, Dr. M. O. Grace, Ozark, and Dr. G. F. Littlepage, Sheffield, Junior Vice-Presidents; Dr. B. B. Simms, Talladega, Secretary; Dr. J. U. Ray, Woodstock, Treasurer. Montgomery was chosen as the next meeting place.

The Alabama Hospital Association has elected the following officers for this year: Dr. French Craddock, Sylacauga, President (reelected); Dr. Ferrin Young, Florala, First Vice-President; Miss Betty Neilson, Sylacauga, Second Vice-President; Miss Lillie Wells, Eufaula, Secretary; Miss Gertrude Whetstone, Sylacauga, Treasurer.

The Medical Alumni of the University of Alabama held their annual banquet during the meeting of the Alabama State Medical Association at Mobile in April and elected the following officers: Dr. Gilbert F. Douglas, Birmingham, President (reelected); Dr. Jerre Watson, Anniston, Dr. C. N. Carraway, Birmingham, and Dr. P. J. M. Acker, Mobile, Vice-Presidents; Dr. J. H. Somerville, Tuscaloosa, Secretary; Dr. J. D. Dowling, Birmingham, Treasurer.

Eye, ear, nose and throat specialists held a meeting in conjunction with the annual Convention of the Alabama Medical Association and elected Dr. H. B. Searcy, Tuscaloosa, as Chairman of the Section. A resolution was passed asking that a section devoted to this work be formed in the Association.

(Continued on page 34)

Stimula in the Summer

LIKE a sensible man this summer you are going to take plenty of outdoor exercise for your health's sake. Golf, swimming, hiking, a fishing trip, or whatever activity suits you best.

But the less active days of winter are going to tell on your muscles, and you can anticipate the aches and pains when you bring them into play.

Now, here's a little product that will help that—Stimula—an ingenious analgesic balm with an Irish moss base. Absorbed in a jiffy and when it sinks in, it helps relieve aching muscles.

Stimula contains camphor, capsicum, menthol, and methyl-salicylate, and the Irish moss base makes it different and more effective.

May we send you a tube of Stimula with our wishes for an enjoyable vacation? Put it in the golf club locker or tuck it away in the traveling bag. You will find a use for it.

The
E. L. Patch Company
BOSTON MASS.

The E. L. Patch Co.,
Stoneham 80, Dept. SM6
Boston, Mass.

You may send me, free of charge, a tube of your Stimula. I would like to know if it is as good as you say it is.

Dr. .....

Address .....

.....

El Paso is the meeting place of the upland West Texas plains and the Rockies; farther west than Denver and Santa Fe, farther south than San Diego, in the same latitude with Cairo, Egypt, but with an altitude of approximately 4,000 feet.

A MOST cordial invitation is extended to the physicians and surgeons of America to visit El Paso on their Portland Convention trip . . . or while on the annual vacation . . . or anytime. The El Paso County Medical Society, and the institutions of El Paso . . . hospitals, tuberculosis sanatoriums, convalescent homes as well as the Gateway Club and the Chamber of Commerce will count it a pleasure and a privilege to make your stopover here both informational and enjoyable. All railroads grant stopovers from an hour to ten days. Wire us time of your arrival either individually, in parties, or by special cars or trains.

Have Your Secretary Mail This Coupon TODAY!

El Paso Gateway Club TEXAS

320 Chamber of Commerce Building

Please send me your two free booklets, *"Filling the Sunshine Prescription"* and *"El Paso, in the Land of Better Living."*

Name_____

Address_____

(Continued from page 602)

Dr. W. R. Seymour, Superintendent of the Alabama Baptist Hospital, Selma, has resigned to do evangelistic work for the Baptist Church.

The Alabama Bureau of Child Hygiene held its Seventh Annual Conference in Montgomery on May 6-8.

Deaths

Dr. Charles M. Lacey, Bessemer, aged 28, died May 3 following an operation.

Dr. John F. Lancaster, Mobile, aged 68, died March 19 of cerebral hemorrhage.

ARKANSAS

The Howard-Pike County Medical Society elected the following officers for the year: Dr. J. L. Roberts, Nashville, President; Dr. E. V. Dildy, Nashville, Vice-President; and Dr. Wm. Ridley Lee, Mineral Springs, Secretary-Treasurer.

Dr. R. H. Guthrie, formerly of Imboden and Little Rock, has been appointed Assistant Superintendent of the Monson Hospital, Palmer, Mass.

Dr. F. Walter Carruthers, Little Rock, recently held a free clinic at Mount Ida, which was largely attended and quite successful.

The Pope County Medical Society has elected the following officers for the year: Dr. A. B. Tate, Atkins, President; Dr. Robert Hood, Vice-President; Dr. W. P. Scarlett, Russellville, Secretary; Delegates to the State Meeting: Dr. G. C. Webb, Russellville, and Dr. R. L. Smith, Russellville.

Dr. S. W. Colquitt has removed from Pine Bluff to Beulah, Miss.

Dr. A. G. Henderson has removed from Piggott to Jonesboro.

Dr. A. R. Russell and Miss Myrtle Chipman, both of Little Rock, were married on April 12.

The following have been appointed County Health Officers: Craighead County, Dr. Herbert H. McAdams, Jonesboro; Mississippi County, Dr. Flem D. Smith, Blytheville; Baxter County, Dr. Scott Appleby, Mountain Home; Marion County, Dr. Lucian M. Weast, Yellville; Sevier County, Dr. Charles A. Archer, DeQueen; Lafayette County, Dr. Felix E. Baker, Stamps; Nevada County, Dr. Jacob B. Hesterly, Prescott.

Deaths

Dr. Robert Andrew Simpson, Hot Springs, aged 56, died March 31.

Dr. Robert L. Meek, Ashdown, aged 65, died suddenly of myocarditis on February 9.

Dr. James M. Murphy, Silex, aged 79, died January 20 of diabetes mellitus.

Dr. Joseph Smith Horner, Hot Springs, aged 70, died February 8 of cerebral hemorrhage.

DISTRICT OF COLUMBIA

Dr. Joel T. Boone, Lieutenant Commander, Medical Corps, U. S. Navy, has been appointed personal physician to President Hoover.

Dr. John A. Foote, Washington, has been appointed Dean of the Medical School of Georgetown University. He has been a member of the faculty for twenty-two years. Dr. Foote succeeds Dr. George M. Kober, who has been made Dean Emeritus and a member of the Board of Regents of Georgetown.

Dr. Warren P. Morrill, formerly Superintendent of the Columbia Hospital for Women, Washington, has been appointed Superintendent of the Maine General Hospital, Portland. Dr. Sterling B. Ragsdale, Geneva, N. Y., has been appointed to fill the vacancy.

Deaths

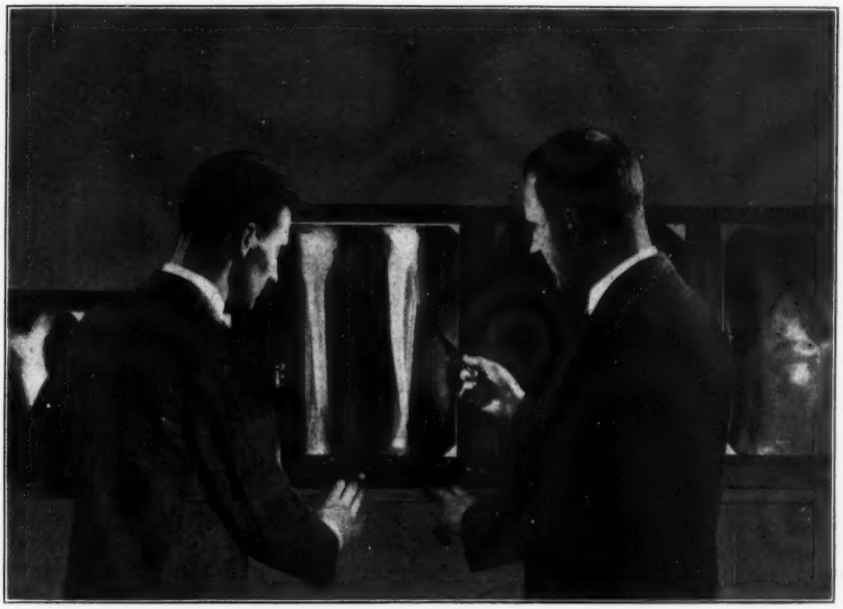
Dr. John Francis Moran, Washington, aged 64, died March 16 of myocarditis, chronic nephritis and arteriosclerosis.

Dr. Duncan A. Carmichael, Washington, aged 77, died February 12 of acute myocarditis.

FLORIDA

At the recent annual meeting of the Florida Medical Association held in St. Augustine, the following officers were elected for the year: Dr. Henry C. Dozier,

(Continued on page 36)



"These radiographs are conclusive"

And this is a regular occurrence in thousands of offices and clinics.

The x-ray occupies a fundamental position in modern diagnostic procedure. Most of the major systemic disturbances can be discovered or confirmed by means of properly made and competently interpreted roentgenograms.

Of course, to ask for an x-ray when any other simpler form of examination is *conclusive* is not suggested. But how many other forms of examination *are* conclusive? Even the x-ray may not decide *all* cases definitely.

Leaders of the profession seem to believe that in cases where there is any uncertainty and to which the x-ray is applicable—the x-ray examination should be required.

Eastman Kodak Company, *Medical Division*
347 State Street, Rochester, N. Y.

Gentlemen:

Please send me free and without obligation the informative booklet "X-rays."

Name ----------

Street and Number ----------

City and State ----------

(Continued from page 34)

Ocala, President; Dr. W. E. Burnett, St. Augustine, First Vice-President; Dr. J. M. Hoffman, Pensacola, Second Vice-President; Dr. J. W. Snyder, Miami, Third Vice-President; and Dr. Shaler Richardson, Secretary and Editor of Journal (reelected).

Dr. G. F. Highsmith, Arcadia, has been elected Secretary of the DeSoto-Hardee-Highlands County Medical Society, succeeding Dr. M. L. Crum, who died recently.

Dr. J. Frank Wilson, Jacksonville, announces the removal of his offices to the Greenleaf and Crosby Building, where his practice will be limited to dermatology.

It has been announced that the Northern Methodist Church is contemplating the erection of a negro hospital in Jacksonville in the near future.

Dr. John A. Simmons has moved his offices from Miami to Arcadia.

Dr. Harold D. Van Schaick, Jacksonville, announces the removal of his offices to the St. James Building.

Deaths

Dr. M. L. Crum, Arcadia, died suddenly on February 17 of heart disease.

Dr. C. M. Merrill, Palm Beach, aged 73, died April 21.

Dr. Franklin S. Miles, Fort Myers, aged 84, died April 1.

Dr. Aaron Rood Ingram, Bee Ridge, aged 78, died February 6 of heart disease.

Dr. Milne Barker Swift, Tangerine, aged 49, died March 2 of cerebral hemorrhage.

Dr. Benjamin Franklin Camp, White Springs, aged 76, died February 10 of cerebral hemorrhage.

GEORGIA

Dr. C. L. Ridley, Macon, has been appointed a member of the State Board of Health for a term of six years.

The Richmond County Board of Education has appropriated $2,700 to defray the expenses of physicians and nurses for work in the public schools of Augusta and Richmond County.

Dr. Dunbar Roy, Atlanta, presented the Fulton County Medical Society with thirty-six engraved photographs of famous physicians and surgeons.

Dr. W. C. Lyle, Atlanta, is now located in the Candler Building and will limit his practice to diseases of the eye.

The Brunswick City Hospital, Brunswick, announces the opening of a ward for tuberculosis.

Dr. H. T. Coggeshall, from the University of Illinois College of Medicine, Chicago, has been retained by the State Board of Health of Georgia to direct a fight against malaria in the State.

Dr. J. A. Redfearn and Dr. Hugo Robinson, both of Albany, have been elected members of the National Malaria Committee.

Dr. C. E. Suggs, Barnesville, has been elected Health Officer for Lamar County.

Dr. J. F. Crane, formerly of Newnan, has removed to Rome.

Dr. George E. Atwood, Waycross, Commissioner of Health for Ware County, recently held clinics in a number of places in the County.

(Continued on page 38)

Ergosterol Derivatives

Among the ergosterol products manufactured by Mead Johnson & Company the following are of particular interest to medical research workers, biochemists and physicians:

ERGOSTEROL, Spectroscopically pure

ERGOSTEROL, Purified, 98-99%, for irradiation

ERGOSTERYL ESTERS

The development of an improved yeast, and of efficient methods of extraction, enable us to offer purified ergosterol crystals (not activated) at $1.50 per gram.

[*A similar advertisement appeared in the Journal of Biological Chemistry in January, 1928*]

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Evansville, Indiana

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We have published a booklet, "Value of Edible Gelatine in Infant and Child Feeding." It contains many valuable suggestions on the proportions and method of preparation for gelatine used in infant feeding, giving specific instances of results achieved with infants and growing children.

Knox Gelatine added to the milk formula largely prevents the formation of hard curds, and so helps to correct regurgitation and vomiting. It is more readily digested and absorbed. Dr. Downey, in his research work at Mellon Institute, determined that the addition of gelatine to the milk mixture materially increases its available nourishment.

Another important use of Knox Sparkling Gelatine is in the diabetic diet. Here it serves as a carrier of concentrated foods, adds to the protein content, and gives the patient a feeling of satiety when the meal is over. Dietitians use it to increase the variety of the liquid and soft diets of convalescents and invalids.

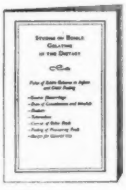
Back of the manufacture of Knox Sparkling Gelatine is 41 years of experience. From raw material to the finished package every process is under constant chemical and scientific control. Knox Sparkling Gelatine is a pure protein, unbleached, unflavored, free from sugar.

QUALITY WITH ECONOMY

Knox Sparkling Gelatine is the highest quality for health. It is a protein in its purest form, particularly suitable where carbohydrates and acids must be avoided. When you purchase Knox Gelatine you not only get quality, but economy, for each package makes four different desserts or salads of six generous servings each.

Further Booklets Available

Recognized dietitians have prepared these additional booklets which explain the uses of Knox Sparkling Gelatine in various illnesses. They offer a number of delicious and appetizing recipes which lend variety to the prescribed diets. Data on interesting scientific tests is also available. Simply check the coupon below and mail to us.



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Please send me, without expense, the booklets which I have marked. Also register my name for future reports on clinical gelatine tests as they are issued.

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☐ Varying the Monotony of Liquid and Soft Diets
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Modern equipped X-Ray Laboratories at Office and Hospitals for Diagnosis and Therapy

An ample supply of Radium for the treatment of superficial and deep lesions in which radium is indicated.

J. PAUL KEITH **D. Y. KEITH**
JOS. CLARK BELL

(Continued from page 36)

Dr. L. W. Van Zandt has removed from Reseca to LaFayette.

Dr. D. W. Pritchett, formerly of Barnesville, has removed to Thomaston.

Whitfield County Medical Society has secured the services of a physician, nurse and oculist to examine every child of school age in Whitfield County.

Dr. R. H. Fike, Atlanta, has been nominated to represent Georgia in the American Society for the Control of Cancer.

Dr. M. P. Parks, Atlanta, is now associated with Dr. R. B. Ridley of that City.

Dr. Albert Russell Bush and Miss Amelia Carolyn Berry, both of Hawkinsville, were married February 20.

Deaths

Dr. Archibald B. Elkin, Atlanta, aged 44, died March 29 of septicemia following a slight laceration of the scalp.

Dr. John Howard Bullard, Machen, aged 79, died in March.

Dr. Vega Berry, Bainbridge, aged 81, died February 28 of injuries received when struck by an automobile.

Dr. Pierce Edwin Griffin, Edison, aged 52, died in March of heart disease.

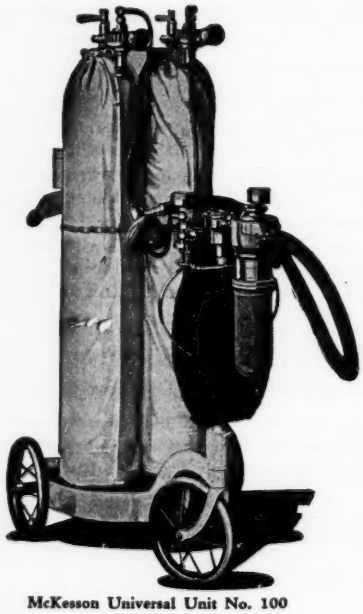
Dr. William Houston Quillian, Thomaston, aged 49, died March 16.

Dr. Christopher Stephen Haynes, Athens, aged 63, died in February of heart disease.

KENTUCKY

Whitley County Medical Society has named the

(Continued on page 40)



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. . . is the only apparatus that can give you all of these essential factors which are necessary in producing results in Anesthesia:

AUTOMATIC FLOW RATE
MAINTAINED PRESSURE
SIMPLICITY of CONTROL
EXTREME SAFETY
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What more could you ask of any mechanical apparatus?

TOLEDO TECHNICAL APPLIANCE COMPANY

Toledo, Ohio

The Original Ultra-Violet Ray Equipment

HAVING pioneered in the design and manufacture of Ultra-Violet Ray equipment, the Hanovia Company has assumed that definite responsibility which attaches itself to leadership in any field.

Today there are more than 150,000 Hanovia Lamps in use by physicians all over the world. This is certainly most convincing proof that the integrity of Hanovia's product has been kept intact. It is also a strong indication that, in the profession, Hanovia Lamps have quickly become the accepted equipment for Ultra-Violet Ray generation.

So that you may have a clear picture of the different types of Hanovia Lamps manufactured, a brief explanation of the various models is given below.

Professional Lamps: First, the Alpine Sun and Kromayer Lamps in their different mechanical adaptions are sold only to the Medical and Dental Profession for clinical use.

Second, the Luxor Model Alpine Sun Lamp, the prescription lamp, furnished both to the profession and to patients, but to the latter only on prescription and under the supervision of the attending physician.

For Scientific Use: Third, the special group of scientific lamp models, used by physicists, chemists, and those occupied in carrying on scientific research work.

For use at home: Fourth, the Home Model Alpine Sun Lamp, a safe and convenient apparatus, for producing tonic and prophylactic effects with Ultra-Violet Rays. This model is not sufficiently intense for clinical use. This lamp was not brought out to promote the indiscriminate use of Ultra-Violet Rays, but to introduce a modality safe for home treatment, and one with which the physician can combat the use, not only of cheap, fraudulent devices, but also inferior Ultra-Violet Lamps. These, by their ineffectiveness, may easily injure public confidence in the entire science of light therapy, and public faith in the physician or surgeon who prescribes it.

For animals and birds: Fifth, are those lamps produced for Veterinarian practice and Animal Husbandry.

We would like very much to have an opportunity to send you literature covering our different model lamps. The coupon below is for that purpose.

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Please send me, without obligation, literature, describing Hanovia Ultra-Violet Lamps.

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Street.....

City.....State.....

BACILLUS ACIDOPHILUS CULTURE
(B. A. CULTURE)

The experience of a large clientele of physicians has demonstrated the value of BACILLUS ACIDOPHILUS CULTURE (B. A. CULTURE) in restoring the normal functioning of the intestinal tract.

B.A. CULTURE, in the convenient 4-ounce size, is effective and economical. It is readily acceptable to the patient and wholly incapable of sensitization or other harm.

Your druggist has, or can easily obtain, B. A. CULTURE.

B. B. Culture Laboratory, Inc.
Yonkers, New York

(Continued from page 38)

following officers for the year: Dr. L. B. Croley, Williamsburg, President; Dr. J. D. Adkins, Williamsburg, Vice-President; Dr. C. A. Moss, Williamsburg, Secretary.

Harrison County Medical Society has elected the following officers for this year: Dr. R. W. Wood, Cynthiana, President; Dr. N. W. Moore, Cynthiana, Vice-President; Dr. W. B. Moore, Cynthiana, Secretary-Treasurer.

Union County Medical Society has elected the following officers for the ensuing year: Dr. H. B. Stewart, Morganfield, President; Dr. D. M. Sloan, Sturgis, Vice-President; Dr. David C. Donan, Morganfield, Secretary.

Dr. Will R. Pryor, former House Surgeon of the Brooklyn Eye and Ear Infirmary, is now associated with Dr. Gaylord C. Hall, 705 Brown Building, Louisville.

Dr. Charles W. Reynolds, Covington, has been elected President of the Board of Education.

Dr. J. W. Davis, Hazard, has been appointed Director of Public Health of Pike County.

Dr. John P. Wyles, Cynthiana, has been appointed Health Officer of Harrison County.

Dr. Charles A. Neal, Nicholsville, has been appointed Health Officer of Jessamine County.

Dr. Paul R. Weeks, Richmond, has been appointed City Health Officer for three years.

About fifteen years ago a survey showed more than 50,000 cases of trachoma in Kentucky. Dr. A. T. McCormack, State Health Officer, estimates that now there are less than 3000 cases. Dr. Joseph A. Stucky, Lexington, who for years has held annual clinics in

(Continued on page 42)

Alkali Deficiency

Many diseases are complicated by an "acidosis." An important part in their treatment consists in replacing those elements needed to maintain the alkali reserve.

In clinical practice a rational and agreeable method of alkalinization is afforded in **Kalak Water.**

1 Liter of Kalak Water requires 710 cc. of a standard tenth-normal hydrochloric acid solution for neutralization of the bases present as bicarbonates or carbonates.

Kalak Water is the strongest alkaline water of commerce.

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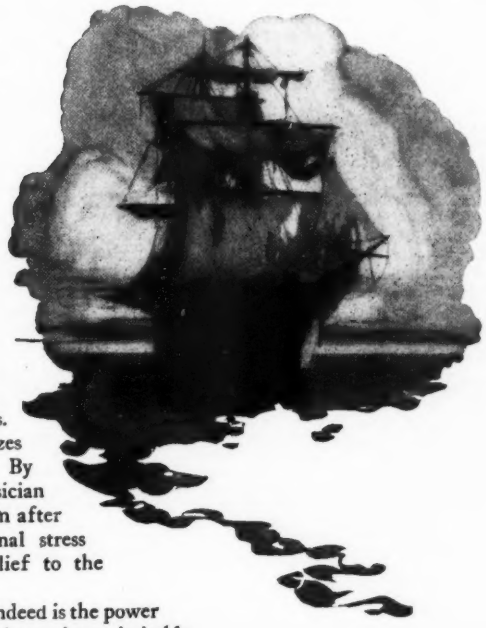
The Calm After the Storm



TOSSED about for many hours by fierce gales, the ship at last rides in calm waters. Blue skies and light breezes bring joy and relief to all. By the same token, the physician who restores mental calm after nervous or emotional stress brings welcome relief to the patient.

Remarkable indeed is the power of Luminal to quiet an irritable nervous system. The sedative effect is secured by a small dose, which can be taken throughout the day without causing drowsiness. Elixir of Luminal (¼ gr. per teaspoonful) is a highly palatable form for such medication.

Indications: Hysteria, Neurasthenia, Cardiac Neuroses, Dysmenorrhea and Climacteric Disturbances.

ELIXIR of LUMINAL

"LUMINAL" REG. U. S. PAT. OFF.
BRAND OF PHENOBARBITAL

Supplied in 4 oz. and 12 oz. bottles

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WINTHROP CHEMICAL COMPANY, INC.
117 HUDSON STREET NEW YORK, N. Y.
CANADA: WINDSOR, ONT.

THERE IS NO SUBSTITUTE FOR WINTHROP QUALITY

(Continued from page 40)

the mountain regions, believes that the improvement has come about partly by educating these people to recognize the symptoms of trachoma and by teaching them sanitation and the value of proper nourishment, even to showing them how to cook certain foods properly.

Deaths

Dr. Allen G. T. Northern, Dycusburg, aged 43, died January 21 of paralysis.

Dr. George Herbert Schaber, Newport, aged 36, died March 10.

Dr. David W. Stephens, Covington, aged 48, died in February of tonsillitis and laryngitis.

Dr. Charles Nelson Goldsborough, Louisville, aged 67, died March 23 of cerebral hemorrhage.

Dr. Milburn N. Nickell, Sharpsburg, aged 41, died March 22 of spinal meningitis.

Dr. Albert Madison Key, Franklin, aged 81, died recently.

LOUISIANA

The Louisiana State Medical Society, at their fiftieth annual meeting held in New Orleans, April 11, elected the following officers: Dr. Frank T. Gouaux, Lockport, President; Dr. Hermann B. Gessner, New Orleans, President-Elect; Dr. Charles M. Horton, Franklin, Dr. Francis C. Bennett, Monroe, and Dr. Roy B. Harrison, New Orleans, Vice-Presidents; and Dr. Paul T. Talbot, New Orleans, Secretary-Treasurer.

Hotel Dieu Hospital, New Orleans, will in the near future inaugurate a system that will give free consultant service to its patients. It will be the first hospital in the United States to give such service. The hospital, with its visiting staff of 125 physicians and surgeons, will donate this service to any patient unable to pay for it.

At the annual meeting of the Louisiana State Pediatric Society the following officers were named: Dr. J. A. Crawford, Lake Charles, President; Dr. John Signorelli, New Orleans, Vice-President; and Dr. C. T. Williams, New Orleans, Secretary-Treasurer.

Beauregard Parish Medical Society has elected the following officers for the year: Dr. R. L. Love, DeRidder, President; Dr. Thos. R. Sartor, DeRidder, Secretary-Treasurer; and Dr. F. R. Frazar, Maryville, Delegate.

Bossier Parish Medical Society has elected Dr. J. B. Hall, Alden Bridge, President, and Dr. C. M. Tucker, Haughton, Secretary-Treasurer, for this year.

Acadia Parish Medical Society has named the following as officers for this year: Dr. H. L. Gardiner, Crowley, President; Dr. M. L. Hoffpauir, Crowley, Vice-President; Dr. A. R. Morgan, Crowley, Secretary-Treasurer.

Washington Parish Medical Society has elected the following as officers for the year: Dr. U. S. Hargrove, Bogalusa, President; Dr. A. W. Martin, Bogalusa, Vice-President; and Dr. J. W. Pafford, Bogalusa, Secretary-Treasurer.

MARYLAND

Dr. Charles D. Steenken has been appointed Superintendent of the Eastern Shore Tuberculosis Sanatorium, Salisbury.

The Baltimore City Health Department is undertaking a campaign to eradicate diphtheria, which will be in charge of Dr. John F. Jempel, Assistant Commissioner of Health. Free clinics have been opened throughout the City.

(Continued on page 44)

INSULIN-MULFORD

Since the discovery of INSULIN by Banting and Best in 1921, there has been a steady improvement in the physical appearance and therapeutic value of the product.

The refinement and testing of INSULIN can only be properly undertaken by laboratories possessing unusual chemical and biological equipment. The Mulford Laboratories are one of four licensed by the University of Toronto and producing INSULIN in the United States.

INSULIN MULFORD is highly purified and of low protein content. Refinement, by the removal of proteidic substances, minimizes local reactions.

There is practically no sting when injected and it is remarkable for its stability and clarity.

10 units per cc in 5 cc vials
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Right Now!

SUMMER FEEDING TROUBLES are already beginning to make an appearance. That many "problem" cases during the warm weather period are preventable is substantiated by the experience of physicians all over the world. They prescribe Dryco because they have found that its use avoids milk-borne infections and nutritional disturbances. We believe that this milk merits your consideration in view of its consistent record of excellent results over a period of many years.

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WHEN ON THE ROAD TO RECOVERY

CONVALESCENCE demands the utmost in recuperative power . . . That is why Horlick's the Original Malted Milk is used with such universally good results when the patient is ON THE ROAD TO RECOVERY.

It supplies nutrients most needed for the rebuilding of health and strength. By the exclusive Horlick process, these food elements are rendered easily and quickly assimilable. For samples, address—

HORLICK—Racine, Wis.

THE ORIGINAL MALTED MILK

HORLICK'S

(Continued from page 42)

The State Medical Society is sponsoring health talks over WBAL, Baltimore, and also WFBR. These talks will be given by prominent men on different subjects and will be broadcast twice a week.

Mr. Frederick Bauernschmidt, Baltimore, has set aside $1,000,000 as a fund to help persons who are unable to pay the full cost of medical care but can pay some. The income of the fund is to be divided among eleven Baltimore hospitals, and after twenty years the principal will also be divided. In 1927 Mr. Bauernschmidt gave $670,000 for the erection and equipment of an addition to the Union Memorial Hospital, Baltimore, which will open in May.

A local branch of the American Urological Association was organized in Baltimore on April 5 and Dr. Hugh H. Young was made President, with Dr. William A. Frontz, Secretary.

The eleventh annual conference of health officers and boards of health was held in Baltimore on May 10-11.

The Baltimore City Medical Society entertained a delegation of urologists from Washington at a dinner April 5, with a view to organizing a urologic society in Baltimore. Dr. Francis R. Hagner, Washington, addressed the Society.

Deaths

Dr. Cecil Nimrod Roger, Baltimore, aged 52, died March 19 of chronic nephritis.

Dr. Brice W. Goldsborough, Cambridge, aged 69, died March 21 of heart disease.

MISSISSIPPI

The Gamble Clinic, Greenville, announces that Dr. J. C. Pegues, formerly of Atlanta, Georgia, will be associated with the Clinic in the eye, ear, nose and throat section.

(Continued on page 46)

When Summer Comes

ENTERITIS and other intestinal disturbances during the summer months call for an efficient intestinal antiseptic.

EACH tablet Calcreose 4 grains contains 2 grains pure creosote combined with calcium hydroxide ... a form of creosote that patients will tolerate.

Liberal sample to physicians for "summer ailments" test.

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MALTBIE
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For Local and General Anesthesia

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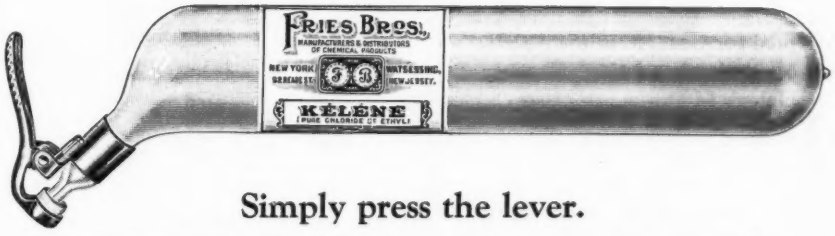
PURE ETHYL CHLORIDE



Simply press the lever.

The automatic closing glass tubes require no valve.

10 Gm., 30 Gm. and 60 Gm. Automatic Closing Tubes.
3 Cc. and 5 Cc. Hermetically Sealed Tubes.

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is utilized to secure the summation of the desirable effects of several drugs"

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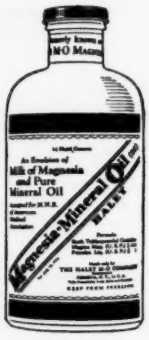
Magnesia-Mineral Oil (25)
HALEY

Accepted for N. N. R. of the American Medical Association formerly Haley's M-O Magnesia Oil

is a uniform, permanent, unflavored emulsion of Milk of Magnesia and Mineral Oil, which exerts LUBRICANT, LAXATIVE and ANTACID action.



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FORMULA:
Each Tablespoonful Contains Magma Mag. (U.S.P.) ℥ iii, Petrolat. Liq. (U. S. P.) ℥ i.

Generous sample and literature on request

Watch the mail for wall chart, "Eulogy of the Doctor"

The
HALEY M-O COMPANY, Inc.
Geneva, New York

(Continued from page 44)

The Kings' Daughters are negotiating for the purchase of the Cranford Hospital, Laurel, and if they do it will be repaired and reequipped and perhaps enlarged.

Dr. E. W. Holmes, Winona, is now specializing in genito-urinary surgery and is associated with his brother, Dr. T. W. Holmes, at the Winona Infirmary.

Dr. C. E. Burnham, formerly of Bay Springs, has removed to Laurel and will specialize in ear, eye, nose and throat work.

Dr. Richard M. Boyd, Aberdeen, was awarded a citation of gallantry by the War Department March 1, in recognition of bravery in action in Cuisy, France, October 7, 1918, when, under shell fire, he cared for and evacuated wounded men.

Dr. James W. Barkley, Ripley, has been appointed Health Officer of Tishomingo County.

Dr. James I. Mayfield, Blue Mountain, has been elected President of the Bank of Blue Mountain.

Deaths

Dr. Alfred Murdock, Gulfport, aged 77, died February 7 of lymphosarcoma and chronic myocarditis.

Dr. Mozart William Rainold, Gulfport, aged 58, died February 26 of chronic myocarditis.

Dr. Lemuel Daniel Chapman, Georgetown, aged 55, died March 15, following an operation.

MISSOURI

The Cooper County Medical Society has elected the following officers for this year: Dr. R. L. Evans, Boonville, President; Dr. G. A. Russell, Boonville,

(Continued on page 48)

CLASSIFIED ADVERTISEMENTS

$1000.00 worth of ear, eye, nose and throat instruments for sale. Will sacrifice. Also Sorensen Suction and Pressure Apparatus. One instrument cabinet and a treatment table. Address Mrs. Inez B. Martin, 721 East 41st Street, Savannah, Georgia.

FOR SALE—Victor combined air and water-cooled mercury-quartz ultra-violet ray. Acme portable high-frequency diathermy machine. Both practically good as new; also balance of laboratory equipment and some surgical instruments. For real bargains address Dr. R. R. Kime, 611 East Washington Street, Orlando, Florida.

FOR SALE—200,000-volt Kelley Koett deep therapy and radiographic outfit complete, including Acme air-cooled cylinder, tube and adjustable couch. Has seen very little use. Installation and guarantee by factory distributor. Cost forty-five hundred. Will sell for twenty-five hundred. S. K., care Southern Medical Journal.

TECHNICIANS are in demand. We are successfully training laboratory and x-ray workers. Send us your assistant and we will return you a competent technician. If you are in immediate need of a well trained helper, write or phone. Full information upon request. Alabama Pathological Laboratory, Birmingham General Hospital, Birmingham, Ala.

LITERARY ASSISTANCE on special medical subjects for busy physicians. We promptly develop any subject of popular or technical interest from the latest authorities, using the unlimited facilities available here. Reasonable rates; correspondence confidential. We also edit, revise and enlarge physicians' manuscripts. Authors' Research Bureau, 500 Fifth Avenue, New York, New York.

DRUG AND ALCOHOLIC PATIENTS are humanely and successfully treated in Glenwood Park Sanitarium, Greensboro, N. C.; reprints of articles mailed upon request. Address W. C. Ashworth, M.D., Owner, Greensboro, N. C.

modern trend in infant feeding

the modern influence in infant feeding has established new ideals and earned the hearty endorsement of thousands of physicians trained in the feeding of infants . . . its simplicity . inherent soundness of principle with a background of intensive scientific research . . . all combine to give the physician a product which not only produces results in the majority of cases but gives these results more simply and more quickly . such has ever been the ideal of S. M. A.

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The "MESCO" Laboratories manufacture the largest line of Ointments in the world. Sixty different kinds. We are originators of the Professional Package. Specify "MESCO" when prescribing Ointments. Send for lists

MANHATTAN EYE SALVE COMPANY

Louisville, Kentucky

(Continued from page 46)

Vice-President; and Dr. T. C. Beckett, Boonville, Secretary-Treasurer.

The Ensworth-Central-Northwestern Medical College Alumni Association will hold its fiftieth annual meeting and banquet in St. Joseph on June 6, with a series of clinics preceding the banquet.

Dr. Louis C. Obrock, St. Louis, has been appointed County Health Commissioner.

The Missouri State Medical Society has moved into larger quarters on the tenth floor of the Missouri Building, St. Louis.

Dr. Rudolph S. Vitt, St. Louis, has been elected President of the Chippewa Trust Company.

Dr. James G. Royse, formerly Assistant Secretary of the Missouri State Board of Health, has been appointed to a position with the U. S. Public Health Service at Chicago.

Dr. Ernest Von Quast, Kansas City, celebrated his fifty-second anniversary in the practice of medicine March 7.

Dr. Earle H. Coon, Nevada, has been appointed Superintendent of State Hospital No. 3.

At a banquet April 2 the Jackson County Medical Society honored the following physicians who have been in practice fifty years: John Wilson, Charles W. Burrill, Homer O. Leonard, Winn F. Morrow, John S. Mott, Caleb A. Ritter, John R. Snell, John H. Thompson, and Ernest Von Quest, Kansas City; and Oliver C. Sheley of Independence.

Deaths

Dr. Samuel Van Hoefen, St. Louis, aged 79, died March 2.

Dr. Zachary Taylor Arnold, Amity, aged 81, died March 3.

(Continued on page 50)

Laboratories of

Drs. Bunce, Landham and Klugh

ATLANTA, GEORGIA

George F. Klugh, M.D., Director, Laboratory of Clinical Pathology
Jackson W. Landham, M.D., Director, Laboratory of Radiology (X-Ray and Radium)

These laboratories are equipped for making every test of clinical value in the diagnostic study of medical and surgical cases. Only standardized methods and technique are used.

In addition to the diagnostic study of cases there are adequate facilities for the x-ray and radium treatment of conditions in which these forms of treatment are indicated.

Containers for pathological specimens and information in reference to x-ray and radium work furnished upon request.

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BARD-PARKER formaldehyde GERMICIDE

Micro-Photographs

Edge of steel blade after boiling in water for five minutes.

Edge of steel blade after 36 hours in Bard-Parker formaldehyde Germicide.

Edge of steel blade before treatment.

A powerful, non-corrosive sterilizing medium of high germicidal efficiency, prepared especially for sterilizing Bard-Parker Knives and other fine surgical instruments.

Extensive laboratory tests indicate that Bard-Parker formaldehyde Germicide:

Destroys the most resisting non-spore-bearing bacteria in less than two minutes.

Destroys the most resisting spore-bearing bacteria in one and a half hours.

Will not injure the keen edge of Bard-Parker Blades or other fine steel instruments after two weeks constant immersion.

PRICES:

One-pint bottles . . .	$ 1.00 each
One carton (12 pints) . .	10.80
One-gallon bottles . . .	5.00 each
One carton (4-one gals.) .	18.00

Ask your dealer for circular giving complete description of Bard-Parker Germicide and Sterilizing Container. Detailed Laboratory Reports will be furnished upon request.

PARKER, WHITE & HEYL, INC.
369 Lexington Avenue, New York, N.Y.

(Continued from page 48)

Dr. James Edward Gartside, Kingston, aged 68, died March 2.

Dr. Buford M. Henry, Alba, aged 59, died suddenly, January 5, of heart disease.

Dr. Wilson Jones Ferguson, Sedalia, aged 63, died March 18 of cerebral hemorrhage.

Dr. Louis Theodore Riesmeyer, St. Louis, aged 71, died February 15 of chronic myocarditis.

Dr. Richard Jefferson Owens, Mill Spring, aged 77, died in February of pneumonia.

Dr. Otto F. Claus, St. Louis, aged 64, died February 22 of heart disease.

Dr. Francis V. Baldwin, Forsyth, aged 72, died February 10, following an operation.

Dr. Henry J. Schlagenhauf, St. Louis, aged 64, died February 20 of heart disease.

NORTH CAROLINA

The Second District Medical Society has elected Dr. M. T. Frizelle, Ayden, President, and Dr. W. C. Whitfield, Grifton, Secretary.

Dr. I. T. Mann, High Point, has moved his offices to 409 Commercial National Bank Building.

Dr. J. T. Burrus, High Point, has been appointed to the Governing Board of the State Hospital for the Insane at Morganton.

The Fifth District Medical Society has elected the following officers: Dr. W. E. Simpson, Rock Hill, President; Dr. A. M. Wylie, Chester, Vice-President; Dr. J. R. Desportes, Fort Mill, Secretary-Treasurer.

Deaths

Dr. Mont Royal Farrar, Greensboro, died March 30.

Dr. J. G. Reynolds, Marion, aged 68, died March 14.

Dr. W. W. McKenzie, Jefferson, died April 2 following a stroke of paralysis.

Dr. James Cornelius Braswell, Whitakers, died April 5 of heart disease.

OKLAHOMA

Under the auspices of the Extension Department of the State University the physicians of Muskogee recently organized a course in surgical anatomy and cadaveric surgery. The course is given under the direction of Dr. J. C. Stephenson, who is head of the Department of Anatomy of the State University.

The Garfield County Medical Society has elected Dr. A. L. McInnis, Enid, President, and Dr. John R. Walker, Enid, Secretary-Treasurer.

Dr. Oliver O. Hammonds, Oklahoma City, has resigned as State Health Officer.

At the annual meeting of the Staff of the Weedn Hospital, Duncan, officers for 1929 were elected as follows: Dr. J. W. Nieweg, President; Dr. H. J. Weedn, Vice-President; and Dr. H. B. Burnett, Secretary.

The Southern Oklahoma Medical Association met at Chickasha April 18th. About sixty-five were present. Dr. A. J. Weedn, Duncan, is President of the Association and Dr. J. W. Nieweg, Duncan, Secretary.

Deaths

Dr. John D. McRee, Yukon, aged 69, died February 3 of heart disease.

Dr. William Henry Case, Tulsa, aged 64, died March 18 of cerebral hemorrhage.

Dr. Rufus Jay Crabill, Allen, aged 67, died February 23 of injuries received in a fall.

(Continued on page 52)

Burns — Scalds

treated with

Wet Dressings of

Hexylresorcinol Solution S. T. 37

rapidly become

Dry—Clean—Insensitive

Relief of Pain is Immediate

Infection is prevented

Rapid healing is promoted

Convenient to use

No Stain or Odor

Three and twelve ounce bottles

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For "Traveling Babies"

OF indispensable value is Klim (powdered whole milk) when babies travel.

Whether incorporated into infant feeding formulae, or used alone as fluid whole milk, Klim has proved its worth. It is simply pure, fresh, full cream milk to which nothing has been added and from which only the water has been removed.

All the vitamines of fluid milk are retained in Klim. The bacterial count is below 6000 per c.c. There are no pathogens. Klim is wholly soluble. Its curd is as fine as boiled milk yet it is not boiled milk. Its butter fat is completely homogenized and does not rise. It is frequently tolerated when an allergy to fluid cow's milk exists.

The above characteristics as well as its uniformity and absolute dependability make Klim indispensable for "traveling babies."

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(Recognizing the importance of scientific control, all contact with the laity is predicated on the policy that KLIM and its allied products be used in infant feeding only according to a physician's formula.)

KLIM
POWDERED WHOLE MILK

Merrell-Soule Powdered Milk Products including Klim, Whole Lactic Acid Milk and Protein Milk, are packed to keep indefinitely. Trade packages need no expiration date.

(Continued from page 50)

Dr. John Craig Taylor, Chelsea, aged 55, died March 4 of pneumonia.

Dr. Horace Tapely Price, Tulsa, aged 53, died March 18 of cerebral hemorrhage.

Dr. A. J. Jeter, Clinton, died March 10 of carcinoma of the colon.

SOUTH CAROLINA

The South Carolina Mental Hygiene Society met in Charleston on May 17 and 18, with two distinguished speakers on the program, who were Dr. George K. Pratt, Assistant Medical Director of the National Committee for Mental Hygiene, and Dr. George S. Stevenson, Director of the Division on Community Clinics.

The memorial to the late Dr. J. Marion Sims, distinguished physician and surgeon, formerly of Columbia, has been completed, and is a handsome monument with the bust of Dr. Sims on the center panel, with the dates of his birth and death. On either side of the panel are lower stones with inscriptions of some of the accomplishments of Dr. Sims carved on them. The memorial was erected at a cost of over $6000, the greater portion of which was raised by the women of South Carolina.

Dr. T. R. W. Wilson, Greenville, is acting Superintendent of the Greenville City Hospital.

Deaths

Dr. Ben F. Goodlett, Travellers' Rest, aged 73, died March 16 of pulmonary tuberculosis.

TENNESSEE

The Bradley County Medical Society elected the following officers for 1929: Dr. W. H. Sullivan, Cleveland, President; Dr. J. L. McKenzie, Cleveland, Vice-President; Dr. E. R. Ferguson, Cleveland, Secretary-Treasurer.

Dr. H. W. Qualls, Memphis, has moved his offices to the Crisler Clinic.

McNairy County Medical Society has elected the following as officers for the year: Dr. R. M. Kendrick, Selmer, President, and Dr. H. C. Sanders, Selmer, Secretary.

Monroe County Medical Society has named the following officers for this year: Dr. H. C. Shearer, Madisonville, President; Dr. T. M. Roberts, Sweetwater, Vice-President; and Dr. H. M. Kelso, Madisonville, Secretary-Treasurer.

Weakley County Medical Society has elected the following officers for 1929: Dr. T. B. Wingo, Martin, President; Dr. G. C. Thomas, Greenfield, Vice-President; Dr. J. E. Taylor, Dresden, Secretary-Treasurer.

Dr. Eugene L. Bishop, Nashville, State Health Commissioner, has been appointed a member of the Board of Scientific Directors of the International Health Division of the Rockefeller Foundation.

Dr. Walter E. Garrey, Professor of Physiology, Vanderbilt University School of Medicine, Nashville, gave a Mayo Foundation lecture at Rochester March 29.

Dr. A. R. Bliss, Jr., of the Department of Pharmacology of the School of Medicine, University of Tennessee, has been made a member of the Committee on Research of the American Association of Colleges of Pharmacy.

Deaths

Dr. Bryce Washington Fontaine, Memphis, aged 51, died March 31.

Dr. James H. Rogers, Sharps Chapel, aged 83, died recently of paralysis agitans.

(Continued on page 54)

ORGANOTHERAPY

can be effective only through the use of dependable endocrine products. The reputation and integrity of the manufacturer is the physician's only guarantee of reliability of those organotherapeutic products for which there is no chemical or biological assay. Every manufacturing process of all our products is supervised by our Analytical and Research Department.

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Insure potency and constancy of action by prescribing the products of

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Manufacturers of Organotherapeutic Products

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Patient Types . . .

The Convalescent

DURING the period of convalescence, Petrolagar is prescribed with great success. It mixes thoroughly with bowel content, mechanically protecting the delicate membrane as does the natural mucus.

Petrolagar avoids any apprehension or anxiety as to bowel function during the days when the patient is slowly regaining strength.

Petrolagar is an emulsion of 65% (by volume) mineral oil with the indigestible emulsifying agent, agar-agar.

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Gentlemen: — Send me copy of "HABIT TIME" (of bowel movement) and specimens of Petrolagar.

Dr.....

Address.....

.....

(Continued from page 52)

Dr. James M. C. Atchley, Hartford, aged 55, died March 9.

TEXAS

The John Sealy Hospital, Galveston, is making final plans for the $350,000 outpatient clinic building which will be a part of their million dollar expansion program this year. This new building will be five stories high in the center portion and four floors in the main part. The first three floors will be used for outpatient purposes with 250 rooms.

At a sectional meeting of the American College of Surgeons, held recently at Phoenix, Arizona, Dr. John T. Moore, Houston, was made Chairman of the Executive Committee from Texas; Dr. W. Burton Thorning, Houston, Secretary; Dr. W. R. Thompson, Fort Worth, Councilor.

The Robert B. Green Memorial Hospital, San Antonio, is to be completely overhauled and remodeled. The repairs will cost $100,000 and will be borne equally by the City of San Antonio and the County of Bexar.

A medical and surgical clinic has been organized at Waco and is composed of Dr. C. L. Goodall, Dr. F. F. Kirby, Dr. W. C. Bidelspach and Dr. H. U. Woolsey. The group will build a clinic building, modernly equipped, work to commence at once on the building.

Construction on the new $600,000 Mary Gates Hospital at Port Arthur will begin soon. There will be a group of five buildings, the main hospital building to be equipped with 100 beds, with an annex for negro patients.

Dr. Ward C. Curtis, formerly of San Angelo, has moved to El Paso and is associated with Dr. Will P. Rogers, Drs. G. H. and Sherod Mengel.

Medina-Uvalde-Maverick-Val Verde Counties Society has elected the following officers for the year: Dr. H. B. Meyer, Hondo, President; Dr. W. G. Brymer, Castroville, Vice-President; and Dr. Lorenzo Cantu, Eagle Pass, Secretary-Treasurer (reelected).

Hopkins County Medical Society elected the following officers to serve during the ensuing year: Dr. W. E. Connor, Cumby, President; Dr. W. W. Long, Sulphur Springs, Vice-President; and Dr. S. Byrd Longino, Sulphur Springs, Secretary-Treasurer (reelected).

Caldwell County Medical Society has elected the following officers for the year: Dr. Jessie Pryor, Luling, President; Dr. Turner O'Banion, Fentress, Vice-President; and Dr. W. P. Morgan, Lockhart, Secretary.

Titus County Medical Society elected the following officers for 1929: Dr. John M. Ellis, Mount Pleasant, Presient; Dr. W. A. Taylor, Mount Pleasant, Vice-President; and Dr. A. A. Smith, Talco, Secretary-Treasurer.

Jasper-Newton County Society has named the following officers for 1929: Dr. T. R. Ogden, Jasper, President; Dr. W. F. McCreight, Kirbyville, Vice-President; and Dr. A. J. Richardson, Jasper, Secretary-Treasurer.

Johnson County Medical Society elected the following officers for the year: Dr. C. C. Bradford, Godley, President; Dr. M. T. Knox, Cleburne, First Vice-President; Dr. C. L. Edgar, Cleburne, Second Vice-President; and Dr. W. P. Ball, Secretary-Treasurer.

The Milam County Medical Society has elected the following officers: Dr. J. W. Fontaine, Jones Prairie, President; Dr. D. E. Monroe, Cameron, Vice-President; and Dr. G. B. Taylor, Cameron, Secretary-Treasurer.

(Continued on page 56)

THOUSANDS OF PHYSICIANS CAN'T BE WRONG

Remember the old war-time song, "Fifty Million Frenchmen Can't Be Wrong?" Neither can thousands of users of ALLISON equipment. We wish we could reproduce here the whole chorus; it would make the greatest advertisement ever written, but space does not permit. However, we do want to impress upon you that where good taste and judgment choose furnishings, ALLISON is invariably selected.

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The Distintive Properties of Gonosan

Inhibits gonococcal development and minimizes its virulence.
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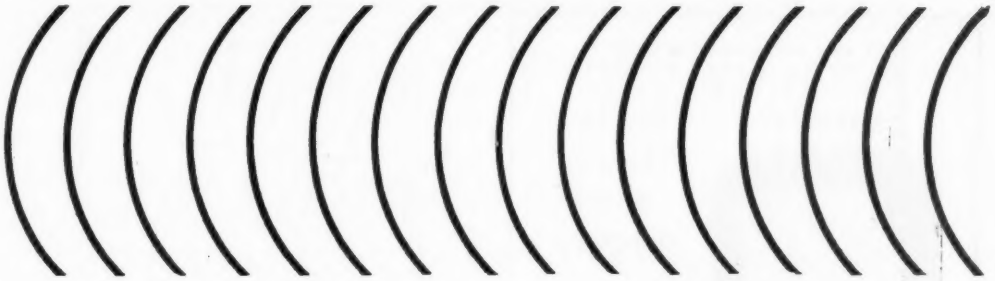

TILLYER LENS CURVES:

an unlimited number—to assure the greatest possible precision

IN designing Tillyer Lenses, no count of the number of bases was made, until the system was finished. Wherever improvement could be made by adding another base, that base was added. No limit was placed on the Tillyer standard of precision . . . . . In this respect Tillyer curves symbolize other Tillyer scientific merits. Read, if you will, the seven points printed opposite . . . we are, naturally, exceedingly proud of them. Their truth is conclusively indicated by the experience of those in the profession who are using Tillyer Lenses. The evolution "from torics to Tillyers" is just as definite and just as certain as was the change from flat to toric lenses.

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1 An entirely new and more accurate basis of calculation, correcting the lens within the narrowest limits ever established, for both astigmatism and powers.

2 Factory tolerance reduced to the most exacting standard ever developed.

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"A word fitly spoken—how good!"
This word came yesterday from a distinguished M.D.
—"The Storm has been tried and proven."

"STORM"

The New "Type N" Storm Supporter

meets demands of present styles in dress.

Long special laced back Extension of soft material low on hips.

Hose supporters attached.

Takes Place of Corsets

Adaptable to Pregnancy, Ptosis, Hernia, Obesity, Sacro-Iliac Relaxation, High and Low Operations, etc.

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Each belt made to order in 24 hours

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DUODENAL TUBES

Sizes 12 to 20 French even sizes

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NEW ORLEANS, LA.

(Continued from page 54)

Deaths

Dr. Thomas Samuel Lorton, Fort Worth, aged 41, died March 13 of heart disease.

Dr. Ollie Reed Stewart, San Antonio, aged 47, died February 19 of pneumonia.

Dr. Francis G. Daehne, Flatonia, aged 65, died March 8 of acute myocarditis.

Dr. James David Creamer, Texarkana, aged 63, died February 26 of pulmonary tuberculosis.

Dr. Madison Mills White, Denison, aged 64, died February 10 of nephritis.

Dr. Joseph McMorries, Fort Worth, aged 79, died February 24 of bronchopneumonia.

Dr. A. A. Blasingame, Kemp, aged 62, died March 3 of pneumonia and meningitis.

VIRGINIA

Upon Dr. Albert Compton Broders, pathologist at the Mayo Clinic, the Medical College of Virginia will confer the honorary Degree of Doctor of Science at commencement, May 28. Dr. Broders is an alumnus of the School of Medicine of the Medical College of Virginia, Richmond.

Dr. Robert P. Cooke, Lexington, now Health Officer for Rockbridge County, has just received a Congressional gold medal for distinguished service. This is a delayed recognition of an act of outstanding heroism which occurred in Cuba in 1900. When Dr. Walter Reed was starting his investigation of the causes of yellow fever and its method of transmission, he was compelled to use volunteers to disprove or to prove certain factors. Dr. Cooke was one of the small group who offered to sleep in the uncleaned hut of a man who had died of yellow fever, to prove whether or not the disease was carried by contact.

At its annual meeting the Warwick County Medical Society elected the following officers: Dr. M. B. Beecroft, Newport News, President; Dr. Samuel Downing, Newport News, Vice-President; and Dr. B. L. Carleton, Newport News, Secretary-Treasurer.

The Wise County Medical Society has elected the following officers: Dr. W. B. Peters, Appalachia, President; Dr. S. P. Gardner, Derby, Dr. T. S. Ussery, Norton, Dr. F. S. Givens, Wise, Vice-Presidents; and Dr. W. R. Culbertson, Norton, Secretary-Treasurer (re-elected).

Dr. J. B. Dalton has returned to Richmond and reopened his offices at 1100 West Franklin Street, limiting his work to orthopedics.

Dr. J. Frank Folk, Warrenton, and Miss Rose H. Hall, Richmond, were married March 28.

The Virginia Tuberculosis Society has appointed Dr. H. A. Latane and Dr. Llewellyn Powell, both of Alexandria, as clinicians to conduct monthly clinics at the local Health Department.

Dr. John B. Fisher, Midlothian, was elected President of the Chesterfield County Protective Association, recently organized for the protection of game in that County.

Dr. Mortimer H. Williams has returned from Europe, where he has been doing post-graduate work, and is again located in Roanoke, limiting his practice to diseases of the eye, ear, nose and throat.

Dr. Charles R. Woolwine, formerly of Davy, West Virginia, is now in charge of the medical work at the Virginia Polytechnic Institute, Blacksburg.

Dr. Blanton Page Seward, Roanoke, was recently elected a Fellow of the Royal Society of Medicine of England.

The Martin County Medical Society held its annual meeting recently and elected the following officers for this year: Dr. V. A. Ward, Robertsonville, President; Dr. E. E. Pittman, Oak City, Vice President;

(Continued on page 58)

Change of Flora Combats

CONSTIPATION

A PREVALENT cause of chronic constipation is the presence of colon poisons from intestinal putrefaction which tend to paralyze the bowel.

Changing the intestinal flora, therefore, not only suppresses putrefaction by promoting the growth of benign acid-forming organisms such as the B. acidophilus, but tends to restore normal intestinal activity.

The experiments of Distaso, Torrey, Rettger and others have shown that lactose and dextrin are, by far, the best foods for promoting the growth of these protective germs in the colon.

The good qualities of both lactose and dextrin, minus their objectionable features, have been combined in the palatable therapeutic food—Lacto Dextrin.

The interesting story of the method of changing the intestinal flora by the use of Lacto Dextrin has been well described in the book, "A Practical Method of Changing the Intestinal Flora."

It also tells how to combine Lacto Dextrin with Psylla (plantago psyllium)—a plant seed which affords bulk and lubrication—in obstinate cases.

Send for a copy and trial tins today.

THE BATTLE CREEK FOOD COMPANY

Dept. SM-6 Battle Creek, Michigan

Send me, without obligation, trial tins of Lacto Dextrin and Psylla, also copy of treatise, "A Practical Method of Changing the Intestinal Flora."

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Get Our Price List and Discounts Before You Purchase
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BRADY'S POTTER BUCKY DIAPHRAGM insures finest radiographs on heavy parts, such as kidney, spine, gall-bladder or heads. $250.00

Curve Top Style—up to 17x17 size cassettes $250.00
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Among the Many Other Articles Sold Are

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DEVELOPING TANKS, 4, 5 or 6 compartment stone, will end your darkroom troubles. Ship from Chicago, Brooklyn, Boston or Virginia. Many sizes of enameled steel tanks.

INTENSIFYING SCREENS—Buck X-Ograph or Patterson Screens for fast exposures, alone, or mounted in cassettes. Liberal discounts. All-metal cassettes, several makes.

If you have a machine have us put your name on our mailing list.

GEO. W. BRADY & CO.
780 So. Western Ave.
CHICAGO

(Continued from page 56)

and Dr. Wm. E. Warren, Williamston, reelected Secretary.

Stuart Circle Hospital, Richmond, will enlarge the Physiotherapy Department in the near future, there being an increased demand for this service. Dr. Mark W. Peyser has been put in charge of this department.

Dr. Charles C. Carr, formerly of Toms Creek, has moved to Elizabethton, Tennessee.

Deaths

Dr. John W. Wallace, Covington, aged 61, died April 1.

Dr. Isaac Tripp Gorsline, Richmond, aged 59, died March 12 after a short illness.

Dr. Joshua Fry Speed, Richmond, aged 52, died February 9.

Dr. Joseph Alfred Guthrie, Portsmouth, aged 63, died March 9.

WEST VIRGINIA

Dr. C. Royal Kessel, West Virginia University physician, has resigned, but will continue to give part-time service to the University.

Dr. Albert H. Hoge, Bluefield, has been elected as President of the Rotary Club.

The Spencer State Hospital remains so overcrowded that no new patients are admitted except when an inmate is discharged or when there is a vacancy caused by death, was the report given the State Board of Control by Dr. W. D. McClung, Superintendent. This institution was not included in the appropriations for new buildings provided by the Legislature, and very little relief from the overcrowded conditions is in sight.

The West Virginia Tuberculosis Association held its eighth annual meeting in Parkersburg, May 1-2.

THE STANDARD
LOESER'S INTRAVENOUS SOLUTIONS
CERTIFIED

LOESER'S INTRAVENOUS
SOLUTION of IRON and ARSENIC

A standardized sterile solution, 5 cc. contain 64 mg. (1 grain) of Colloidal Iron Cacodylate. In hermetically sealed Jena glass ampoules.

In 12 years, steadily increasing numbers of physicians have demonstrated the safety and practicability of its intravenous injection and therapeutic value in the treatment of all Secondary Anaemias following Malaria, Pellagra, Influenza and other infections as well as Surgical Procedure.

Clinical Data sent on request.

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CONSTIPATION

"The substitution of one of the maltose-dextrins mixtures for milk or cane sugar also sometimes relieves constipation in little babies.*** Those preparations which contain the potassium salts are apparently somewhat more laxative than those containing the sodium salts."

MEAD'S DEXTRI-MALTOSE

From Text Books of over a decade

MEAD'S DEXTRI-MALTOSE No. 3 (with potassium bicarbonate) is indicated for constipated babies. Potassium salts added to cow's milk cause the formation of a soft coagula and softer stools.

In human milk there is a preponderance of potassium over calcium salts, while calcium salts predominate in cow's milk. The calcium in cow's milk tends to cause the formation of large tough curds in which are enveloped large quantities of fat.

Sufficient potassium salts tend to overcome the preponderance of calcium resulting in a soft flocculent curd. By freeing the fat from its envelope of casein, it comes in more intimate contact with the digestive juices resulting in a better metabolism and softer stools.

THE MEAD POLICY

MEAD'S INFANT DIET MATERIALS *are advertised only to physicians. No feeding directions accompany trade packages. Information in regard to feeding is supplied to the mother by written instructions from her doctor, who changes the feedings from time to time to meet the nutritional requirements of the growing infant. Literature furnished only to physicians.*

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The Value of Colloidal Silver

From the ancient days of the Arabian physicians, Geba and Avicenna, has come the use of silver as a therapeutic agent. Its best modern exhibition is in the form of NEO-SILVOL, a silver protein product which is therapeutically effective without causing irritation, and which leaves no dark tell-tale stains.

Neo-Silvol Contains 20% Silver Iodide in Colloidal Form

Note these facts: Neo-Silvol is fatal to the gonococcus, streptococci, staphylococci, pneumococci, and Micrococcus catarrhalis. Against streptococci and staphylococci it is as actively germicidal as *pure phenol*—and applicable in much more concentrated solution. Against the gonococcus it is *20 times as active as pure phenol.* Yet Neo-Silvol does not precipitate tissue chlorides, nor does it coagulate cellular albumin; weak acids or alkalis or dilute alcohol do not precipitate it.

Neo-Silvol should be at hand for use in treating infectious inflammation of *any mucous membrane*—in eye, ear, nose, throat, urethra, or bladder.

HOW SUPPLIED

In 1-oz. and 4-oz. bottles of the granules—In 6-grain capsules, bottles of 50, convenient for making solutions—As a 5% ointment in 1-drachm tubes—In the form of Vaginal Suppositories, 5%, boxes of 12

Shall we send you a sample of the capsules?

PARKE, DAVIS & COMPANY
DETROIT, MICHIGAN